OMRON

Smart Curing System

Mega Power Type

ZUV Series

User's Manual

Cat. No. Z281-E1-01

Introduction

Thank you for purchasing the ZUV.
This manual provides information regarding functions, performance and operating methods that are required for using the ZUV.
When using the ZUV, be sure to observe the following:

- The ZUV must be operated by personnel knowledgeable in electrical engineering.
- To ensure correct use, please read this manual thoroughly to deepen your understanding of the product.
- Please keep this manual in a safe place so that it can be referred to whenever necessary.

Introduction	APPLICATION CONSIDERATIONS (Please Read)
Section 1	OVERVIEW & INSTALLATION AND CONNECTION
Section 2	ZUV BASIC OPERATION
Section 3	SETUP
Section 4	CONNECTING TO EXTERNAL DEVICES
Section 5	APPENDIX

User's Manual

Smart Curing System

Mega Power Type
ZUV Series

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

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OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

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Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

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Meanings of Signal Words

The following signal words are used in this manual.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Meanings of Alert Symbols

The following alert symbols are used in this manual.

	Indicates the possibility of LED radiation.
	Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.
	Indicates the possibility of injury by high temperature under specific conditions.

Alert statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in this manual to attract your attention.

⚠ WARNING

Never look directly at or allow your skin to be exposed to the ultraviolet light.
To prevent exposure to ultraviolet light, never look into the ultraviolet light.
Workers should wear protective goggles and equipment to protect from being exposed to reflected light.

Electric shock or light leakage may cause injury.
Do not disassemble the product.

⚠ CAUTION

Do not touch the product while the power is ON or immediately after the power is turned OFF. Doing so may result in burn injury from a hot component.

Precautions for Safe Use

Please observe the following precautions for safe use of the product:

1.Installation Environment

- Do not use the product in environments where it can be exposed to inflammable/ explosive gas.
- To ensure safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.

2.Power Supply and Wiring

- When using an AC power supply, use the AC adaptor (supplied with the product, 100 to 240 VAC ±10%).
- When using a DC power supply, the supply voltage must be within the rated range (24 VDC ±10%). In addition, reverse connection of the power supply is not allowed.
  Recommended power source: S8VS-18024 (24 VDC 7.5A) by OMRON
- Open-collector outputs should not be short-circuited.
- Use the power supply within the rated load.
- High-voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
- Should you notice any abnormalities such as smoke, abnormal heat of the product surface, and/or any foul odor, immediately stop use, turn OFF the power supply, and disconnect the power plug from the outlet. Contact your OMRON representative for repair of the product. Repairing it by yourself may cause danger.

3.Irradiation Head

- Do not touch the head or lens for an extended period while there is UV light irradiation. Doing so may cause a burn injury.

4.Other

- Do not attempt to dismantle, repair, or modify the product. Doing so may cause the product to not operate correctly as well as cause a malfunction resulting in a fire or an electric shock.
- Dispose of this product as industrial waste.
- Do not drop the product.
  If the product is dropped or damaged, turn OFF the power supply, disconnect the power plug from the outlet, and contact your OMRON representative. Using it continuously without repair may cause a fire.
- Do not insert any foreign objects into the product through the ventilation hole or any other opening. Doing so may cause a fire or electric shock.
- Do not install multiple controllers close to others, or do not pile them up. Doing so may cause a fire or breakdown of the product.
- If some national regulation requires a health check for operators handling ultraviolet waves, please take proper means for ZUV by yourself according to the regulation.

Precautions for Correct Use

Please observe the following precautions to prevent faulty operation and malfunction of the product and adverse influence on performance and devices.

1.Installation Site

Do not install the product in locations subjected to the following:

- Ambient temperature outside the rating
- Rapid temperature fluctuations (causing condensation)
- Relative humidity outside the range of 30 to 85%
- Presence of corrosive or flammable gases
- Presence of dust, salt, or iron particles
- Direct vibration or shock
- Reflection of intense light (such as other UV lights, laser beams, or electric arc-welding machines)
- Direct sunlight or near heaters
- Water, oil, or chemical fumes or spray, or mist environment
- Strong magnetic or electric field

2.Power Supply and Wiring

- When using a controller, make sure that the FG terminal on the main unit is grounded. p.4-3
- When using a DC power supply, make sure that the power source is grounded.
- When using a DC power supply, observe the following points:
  - When using a commercially available switching regulator, make sure that the FG terminal is grounded.
  - If surge currents are present in the power lines, connect surge absorbers that suit the operating environment.
  - Before turning ON the power after the product is connected, make sure that the power supply voltage is correct, there are no incorrect connections (e.g. load short-circuit) and the load current is appropriate.
- Before connecting/disconnecting the head, make sure that the controller is turned OFF.
- Connect/disconnect the lens unit while the UV light is not being irradiated.
- Use only combinations of the head and controller specified in this manual.
- The exclusive extension cable can be used between head and controller. However, do not use multiple extension cables for conjunction use.
- Irradiation log data may not be saved if the power supply switch (main power supply) on the rear of the controller is turned OFF during operation.

3.Cleaning

- Do not use paint thinner, benzene, acetone, or kerosene for cleaning since these solutions dissolve the product surface.
- Use commercially available alcohol.
- To remove dirt or dust particles from the lens, wipe gently with a soft cloth (for cleaning lenses) moistened with a small amount of alcohol.

4.About Resin Hardening

The hardening state of resin varies depending on various factors. Check the hardening state of resin on an ongoing basis and set the optimum conditions.

5.Replacing the Head

When replacing the head, be sure to initialize the target channel on the controller.

If the target channel is not initialized, the information (cumulative irradiation energy, power tuning data) of the head before replacement may still remain and prevent normal functioning of the head.

p.3-22

6.Installing the Head

Be sure to use the mounting bracket (supplied) for installing the head.

Also, use the mounting bracket within the specified installation range.

The mounting bracket is used to radiate heat. Misuse of the mounting bracket may cause the head to heat up and shorten the life of the LEDs.

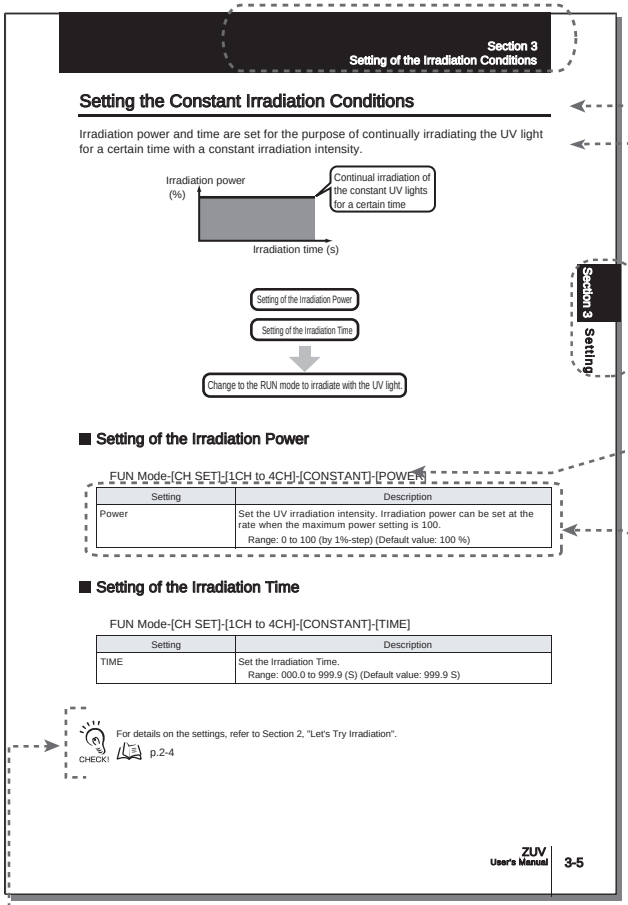
7.Connecting the Head

When removing and re-connecting the head, be sure to connect to the same channel.

If the head is connected to a different channel, information (cumulative irradiation energy, power tuning data) specific to the head is not inherited, preventing the head from functioning normally.

Editor's Note

Page Format


Section 3
Setting of the Irradiation Conditions
Setting the Constant Irradiation Conditions
Irradiation power and time are set for the purpose of continually irradiating the UV light for a certain time with a constant irradiation intensity.
Irradiation power (%)
Continual irradiation of the constant UV lights for a certain time
Irradiation time (s)
Setting of the Irradiation Power
Setting of the Irradiation Time
Change to the RUN mode to irradiate with the UV light.
Section 3 Setting
■ Setting of the Irradiation Power
FUN Mode-[CH SET]-[1CH to 4CH]-[CONSTANT]-[POWER]
Setting
Description
Power
Set the UV irradiation intensity. Irradiation power can be set at the rate when the maximum power setting is 100.
Range: 0 to 100 (by 1%-step) (Default value: 100 %)
■ Setting of the Irradiation Time
FUN Mode-[CH SET]-[1CH to 4CH]-[CONSTANT]-[TIME]
Setting
Description
TIME
Set the Irradiation Time.
Range: 000.0 to 999.9 (S) (Default value: 999.9 S)
CHECK!
For details on the settings, refer to Section 2, "Let's Try Irradiation".
p.2-4
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Title of each section

Header

Overview

Index label

Indicates the section number and title.

Movement through menus up to setting items

Explanation of options

Supplementary Explanation

Helpful information regarding operation and reference pages are introduced here using symbols.

CHECK!

* This page has been made purely for explanatory purposes and does not exist.

■ Meaning of Symbols

Menu items that are displayed on the controller's LCD screen, and window, dialog boxes and other GUI elements displayed on the PC are indicated enclosed by brackets [ ].

■ Visual Aids

Indicates points that are important to ensure full product performance, such as operational precautions and application procedures.

Indicates pages where related information can be found.

Indicates information helpful in operation.

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MEMO

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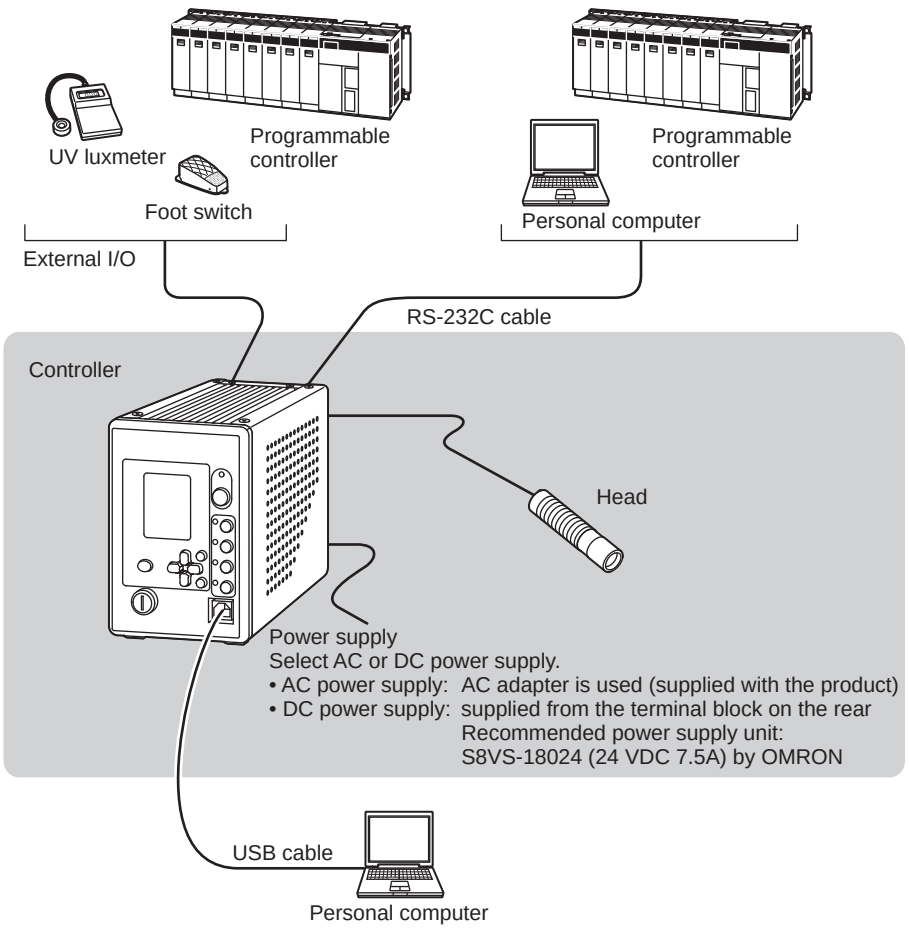
Basic Configuration

The figure below shows the basic configuration of the ZUV.

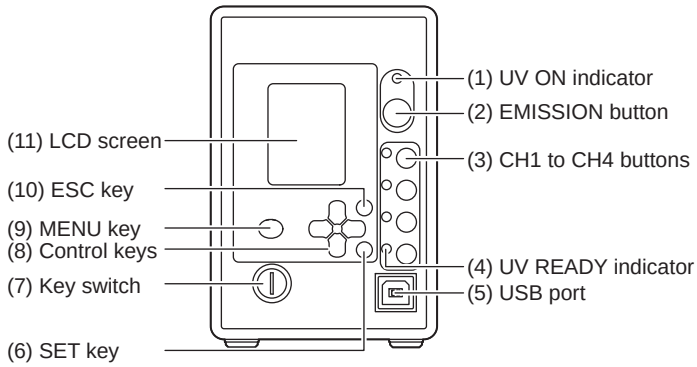


Part Names and Functions

This section describes the names and functions of parts on the controller and head.

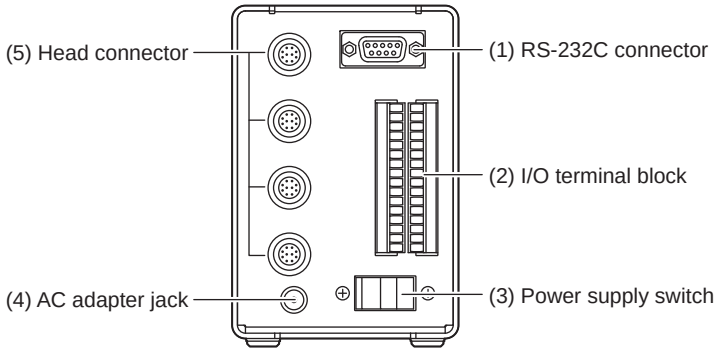
Controller

■ Front



Name	Function	
	LOCK Mode	READY Mode
(1) UV ON indicator	Goes out.	Lights during UV irradiation.
(2) EMISSION button	—	Pressing this button starts/stops UV light irradiation from the irradiation standby head.
(3) CH1 to CH4 buttons	—	The head corresponding to the pressed button starts/stops UV light irradiation.
(4) UV READY indicator	Goes out.	Lights in the irradiation standby mode when the key switch is turned to the "READY" position. Note that the indicator goes out during UV irradiation. The channel corresponding to the connected head lights.
(5) USB port	Connect the USB cable to the USB port to connect to a personal computer.	
(6) SET key	Selects and applies items when they are being set.	—
(7) Key switch	Operating this key switches between the LOCK and READY modes. LOCK mode: Irradiation conditions can be set in this mode. Irradiation is disabled. READY mode: Irradiation is enabled in this mode.	
(8) Control keys	Move the cursor and change numeric values.	The ← → L/R keys change the display screen during operation. The ↑ ↓ UP/DOWN keys change the display channel.
(9) MENU key	Saves settings.	—
(10) ESC key	Cancels the setting, and returns to the one previous menu.	—
(11) LCD screen	Displays a display screen or setting menu during operation. Operating Modes p.2-11	

■ Rear



Name	Function
(1) RS-232C connector	Connects to the personal computer or programmable controller via the serial cable to control input from external devices. p.4-10
(2) I/O terminal block	Connects external devices such as the foot switch. p.4-2
(3) Power supply switch	Switches the main power supply ON/OFF. The ON/OFF direction differs between the AC power supply and the DC power supply. Check the ON/OFF direction printed on the main unit.
(4) AC adapter jack	Connects to the AC power supply. p.1-8
(5) Head connector	Connects to the head.

Head

ZUV-H__M/ZUV-H__H

Name	Function
(1) UV irradiation nozzle	UV light is irradiated from this nozzle.
(2) Connector	Connects to the controller.

Installation & Connection

Before Installation and Connection

■ Checking the installation environment

Read "Precautions for Safe Use" at the beginning of this manual, and check the installation environment.

■ Checking the installation site

Read "Precautions for Correct Use" at the beginning of this manual, and check the installation site.

■ Power supply

Before installing and connecting the controller, be sure to turn it OFF.

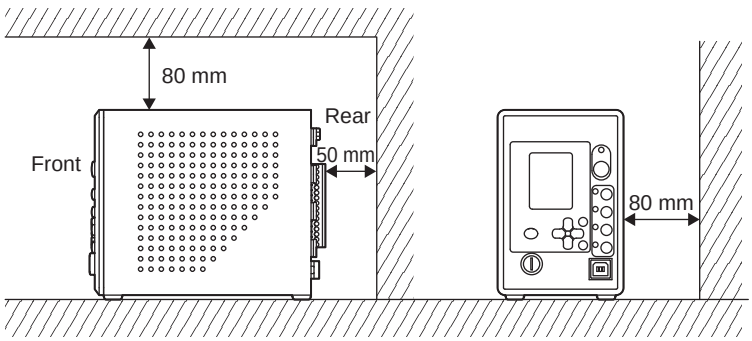
Also read "Precautions for Safe Use" and "Precautions for Correct Use" at the beginning of this manual, and check the power supply and wiring.

Installing the Controller

CHECK!

Before connecting/disconnecting peripheral devices, make sure that the controller is turned OFF.

Maintain sufficient space around the controller for installation.



CHECK!

Do not install multiple controllers close to others, or do not pile them up.

Installing the Head

⚠ WARNING

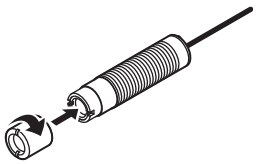
Never look directly at or allow your skin to be exposed to the ultraviolet light.
To prevent exposure to ultraviolet light, never look into the ultraviolet light.
Workers should wear protective goggles and equipment to protect from being exposed to reflected light.

Electric shock or light leakage may cause injury.
Do not disassemble the product.

■ Installing the head unit and lens unit

1. To install the lens unit, screw it into the head unit.

Tightening torque: 0.2 N•m



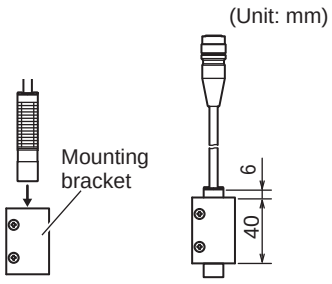
CHECK!

- Screws may be damaged if the torque is outside the specifications.
- Other lens units cannot be installed on head unit ZUV-H40M since a fixed type exclusive lens is attached.

■ Connecting the Head

Install the head using the mounting bracket supplied with the head.

1. Insert the head into the mounting bracket.

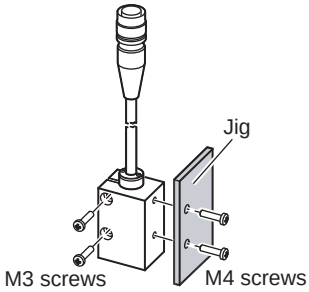


2. Fix the head to the mounting bracket.

Screws: M3 x 2

Tightening torque: 0.9 N•m or more to 1.5 N•m or less

CHECK! Be sure to use the screws supplied with the head.



3. Fix the mounting bracket to the jig.

Screws: M4 x 2

Tightening torque: 1.2 N•m

Connecting Devices

CHECK!

- Before connecting/disconnecting peripheral devices, make sure that the controller is turned OFF.
- For details on connecting external devices, see "Section 4 CONNECTING TO EXTERNAL DEVICES."

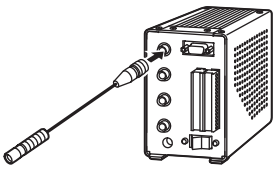
⚠ WARNING

Never look directly at or allow your skin to be exposed to the ultraviolet light.
To prevent exposure to ultraviolet light, never look into the ultraviolet light.
Workers should wear protective goggles and equipment to protect them from being exposed to reflected light.

Electric shock or light leakage may cause injury.
Do not disassemble the product.

■ Connecting the head

1. Insert the head connector to the head connector on the controller rear by aligning the female and male pins of each side of the connectors.



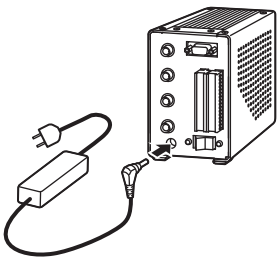
■ Connecting the AC Adapter

1. Connect the AC power supply cable to the AC adapter jack on the controller rear.

CHECK!

The DC power supply can also be used.

Wiring p.4-3



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Starting Up and Shutting Down

⚠ WARNING

Never look directly at or allow your skin to be exposed to the ultraviolet light.
To prevent exposure to ultraviolet light, never look into the ultraviolet light.
Workers should wear protective goggles and equipment to protect them from being exposed to reflected light.

Electric shock or light leakage may cause injury.
Do not disassemble the product.

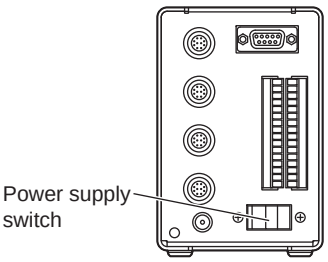
CHECK!

- Before turning ON the power supply confirm that the controller and head are properly connected.
- Remove the key from the key switch when the controller is not in operation.

■ Starting Up

1. Check that the key switch on the controller front is set to the LOCK position.

2. Set the power switch on the controller rear to ON.

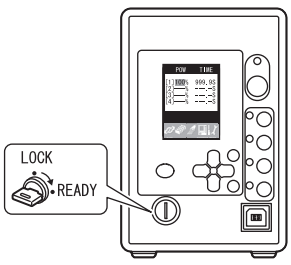


CHECK!

- The ON/OFF direction differs between the AC power supply and the DC power supply.
p.1-4
- The Japanese-to-English selection message is displayed only at initial startup.
- When the password function is enabled, the password must be entered.
p.2-11

3. Insert the key in the key switch on the controller front and turn it to the [READY] position when the LOCK mode top menu is displayed.

The ZUV enters the irradiation ready mode.
In addition, the UV READY indicator on the head, which is in the irradiation ready mode, lights up when the mode is switched to the READY mode.



■ Shutting Down

Save the setting data before turning OFF the power supply. All settings will be deleted if you turn the power OFF without saving the data.

Saving the setting data

1. Press the MENU key to save setting data.

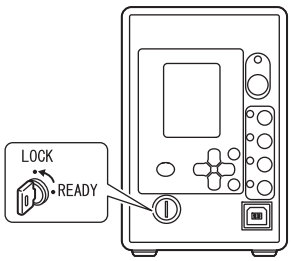
The save confirmation message is displayed.

The save confirmation message is displayed when the mode is switched to the READY mode without saving the setting data using the MENU key. The save confirmation message is displayed only when the settings have been changed. Otherwise, it is not displayed.

2. Move the cursor to [EXE] using the « » keys, and press the SET key.

Turning OFF the power

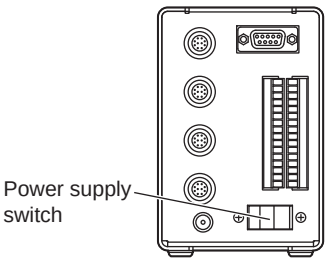
3. Turn the key of the key switch on the controller front to the [LOCK] position.



4. Set the power switch on the controller rear to OFF.

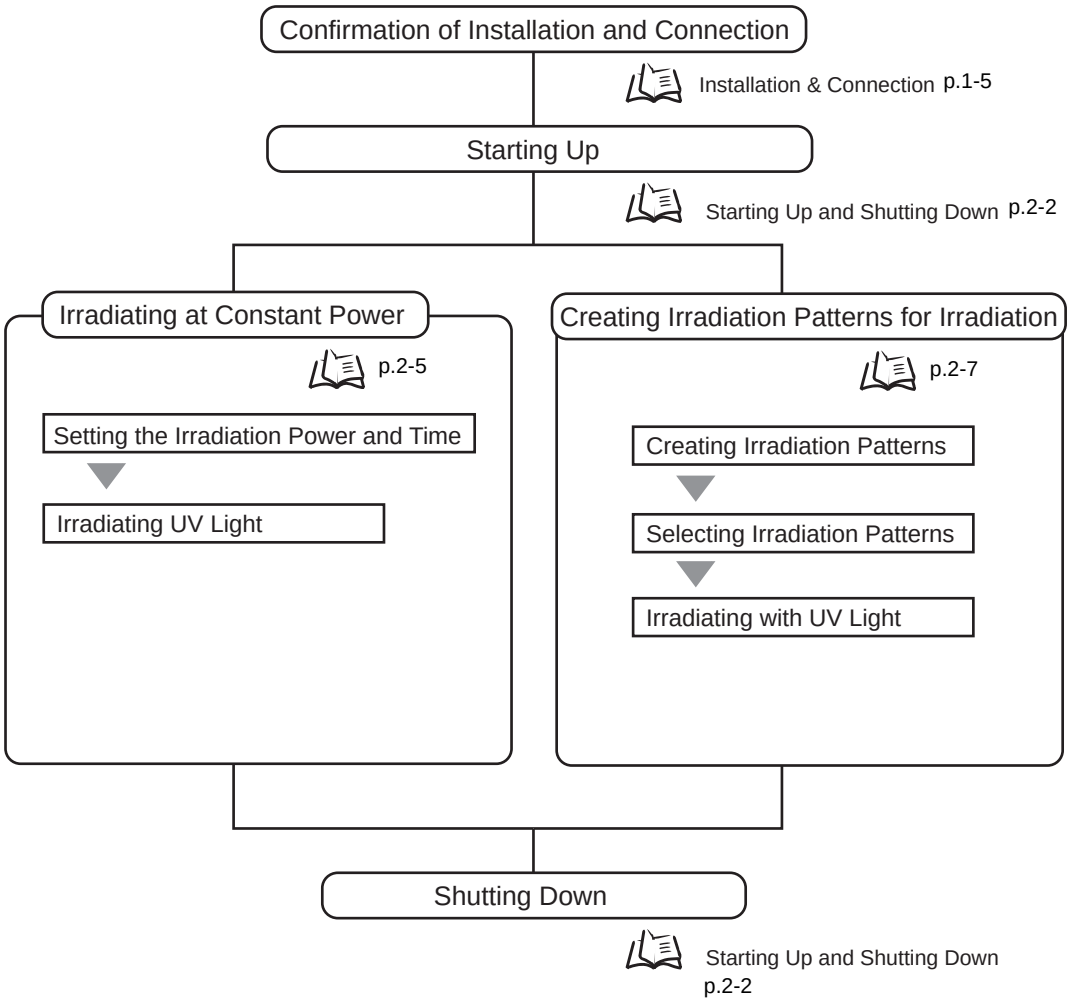
- Remove the key from the key switch when the controller is not restarted.
- The ON/OFF direction differs between the AC power supply and the DC power supply.

p.1-4



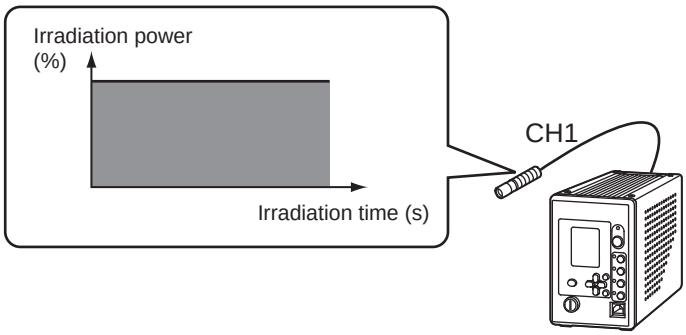
Let's Try Irradiation

This section describes the basic operating procedures from setting the irradiation conditions up to performing constant irradiation or pattern irradiation.



Irradiating at Constant Power

In this irradiation mode, irradiation is performed continuously at constant irradiation power for a specified time.



This section describes the procedures from setting the irradiation power to "65%" and the irradiation time to "60 seconds" up to irradiating UV light.
Irradiation power can be set at a percentage (%) when the maximum power setting is 100.

Setting the irradiation mode

1. Set the irradiation mode in the LOCK mode top menu.

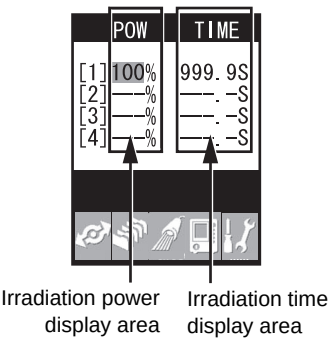
When the ZUV is in the READY mode, turn the key switch to the [LOCK] position to switch to the LOCK mode.

CHECK!

- Check to see if the LOCK mode setting menu is displayed on the LCD screen.
- When the password function is enabled, the password must be entered.

p.2-11

<LOCK mode top menu>

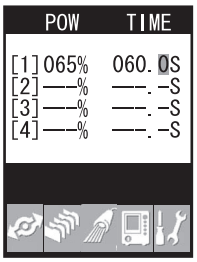


2. Move the cursor to the irradiation power/time to change for each channel using the keys, and press the SET key to apply the setting.

The uppermost digit is displayed on a white background.

3. **Change the numerical value using the ▲▼ keys and the digit using the ◀◀ ▶▶ keys, and press the SET key to apply the setting.**

Set the irradiation power to "65%" and the irradiation time to "60 seconds".



CHECK!

- Irradiation power can be set as a percentage when the setting of maximum power is 100.
- A maximum of 999.9 seconds can be set for the irradiation time.
- For channels to which a head is not connected, "- - -" is displayed and the cursor skips these channels.
- To set an infinite irradiation time, select the unlimited irradiation mode in the Irradiation Conditions Setting Menu.

▶ LOCK mode-[CH SET]-[1CH to 4CH]-[PATTERN]-[LIGNT TIME]-[UNLIMITED]

p.3-5

Irradiating UV light

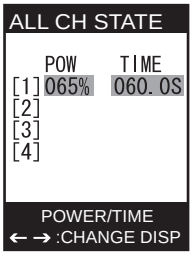
4. **Press the MENU key to save the settings, and turn the key switch to the [READY] position to switch to the READY mode.**

CHECK!

The save confirmation message is displayed when the mode is switched to the READY mode without saving the setting data using the MENU key. The save confirmation message is displayed only when the settings have been changed. Otherwise, it is not displayed.

5. **Pressing the EMISSION button starts UV light irradiation.**

The UV ON indicator lights up during irradiation, and the irradiation conditions are displayed on the LCD screen. In addition, a buzzer sounds at the start and end of irradiation.



CHECK!

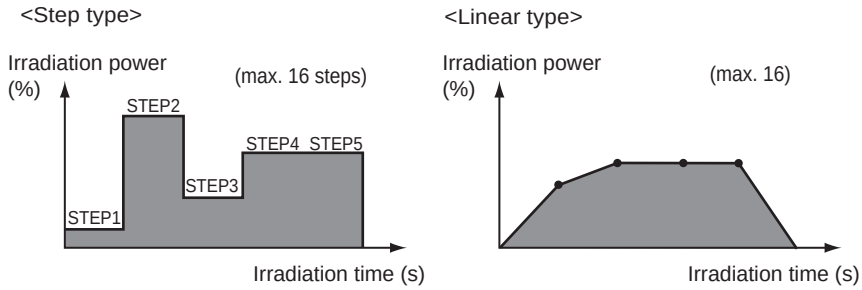
- The screen can be switched to the channel specific detail display, and the cumulative energy or intensity power adjustment screen.

About the screen display during operation p.2-15

- To stop irradiation when the irradiation time has been set as unlimited, press the EMISSION button or the corresponding CH button.

Creating Irradiation Patterns for Irradiation

Irradiation patterns can be created in combination with irradiation power and irradiation time for the purpose of irradiation.

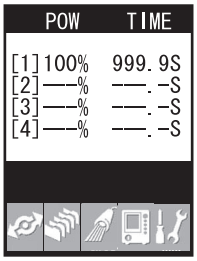


This section describes the procedures for creating a step-type pattern and using that pattern to irradiate UV light.

Entering the irradiation conditions menu

1. Set the pattern in the LOCK mode top menu.

When the ZUV is in the READY mode, turn the key switch to the [LOCK] position to switch to the LOCK mode.



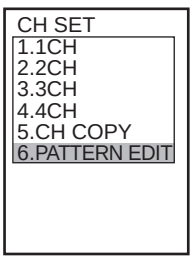
CHECK!

- Check to see if the LOCK mode setting menu is displayed on the LCD screen.
- When the password function is enabled, the password must be entered.

p.2-11

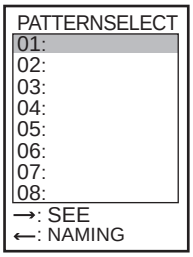
2. Select (CH SET) using the keys, and press the SET key.

3. Move the cursor to [PATTERN EDIT] using the keys, and press the SET key.



Creating irradiation patterns

4. **Move the cursor to [01] using the keys, and press the SET key.**

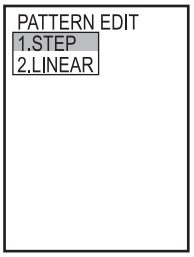


CHECK!

Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

Setting Pattern Names p.3-7

5. **Move the cursor to [STEP] using the keys, and press the SET key.**

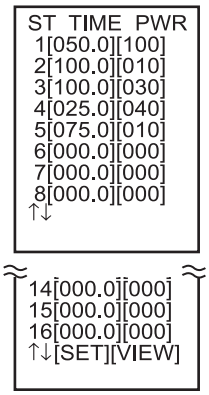


CHECK!

A different screen is displayed when a pattern, for which the setting is complete, is selected. To change and delete the screen display, select [CORRECT] and [CLEAR], respectively.

6. **Set the irradiation time (s) and power (%) for the respective step using the keys and the SET key.**

Irradiation power can be set as a percentage (%) when the maximum power setting is 100.

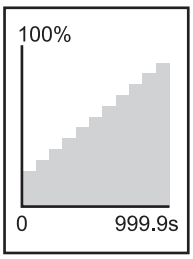


CHECK!

Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

CHECK!

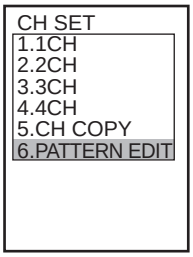
Moving the cursor to [VIEW] and pressing the SET key allows you to check the irradiation pattern that is being set in graph form.



7. **Move the cursor to [SET] using the keys, and press the SET key.**

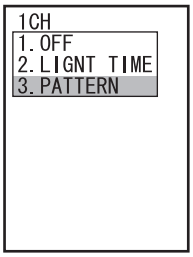
Selecting irradiation patterns

8. **Press the ESC key once.**
The screen display returns to the one shown on the right.



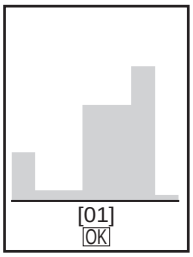
9. **Move the cursor to [1CH] using the keys, and press the SET key.**

10. **Move the cursor to [PATTERN] using the keys, and press the SET key.**



11. **Move the cursor to [xx] using the keys, and press the SET key.**

12. **Select a pattern using the keys, and press the SET key.**



CHECK! Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

13. **Move the cursor to [OK] using the keys, and press the SET key.**

Irradiating UV light

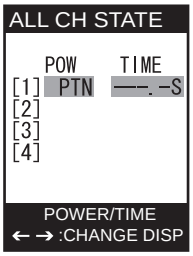
14. **Press the MENU key to save the settings, and turn the key switch to the [READY] position to switch to the READY mode.**

CHECK!

The save confirmation message is displayed when the mode is switched to the READY mode without saving the setting data using the MENU key. The save confirmation message is displayed only when the settings have been changed. Otherwise, it is not displayed.

15. **Pressing the EMISSION button starts UV light irradiation.**

The UV ON indicator lights up during irradiation, and the irradiation conditions are displayed on the LCD screen. In addition, a buzzer sounds at the start and end of irradiation.



CHECK!

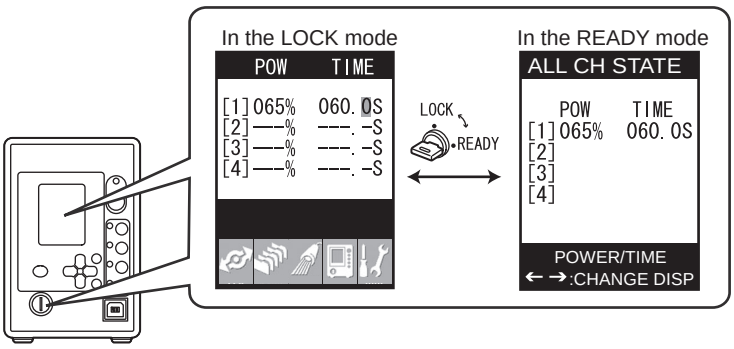
- The screen can be switched to the channel specific detail display, and the cumulative energy or intensity power adjustment screen.

About the screen display during operation p.2-15

- To stop irradiation when the irradiation time has been set as unlimited, press the EMISSION button or the corresponding CH button.

Operating Modes

The ZUV has the following two operating modes. Switch to the desired mode before you start operation.
To switch to the operating mode, use the key switch.



Operating Mode	Description
LOCK mode	Mode for setting functions p.2-13
READY mode	Mode for performing operations p.2-15

■ Password entry

When the password function is set to [Enabled], the password must be entered when the mode is switched to the LOCK mode or to the adjustment mode in the intensity power adjustment screen in the READY mode.

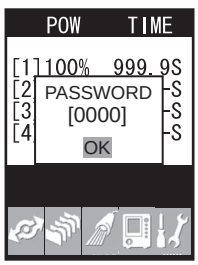
Setting passwords p.3-20

Entering passwords

1. The password entry field is displayed on screen.

2. Move the cursor to the numerical value entry field using the key, and apply the settings by the SET key.

Digits that can be changed are displayed on a white background.



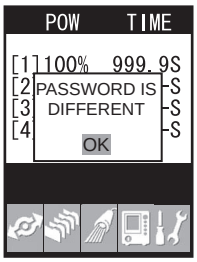
3. **Change the numerical value using the keys and the digit using the keys, enter all four digits, and press the SET key to apply the setting.**

4. **Move the cursor to [OK] using the key, and press the SET key.**

The password lock is canceled, and the display returns to the LOCK mode top screen.

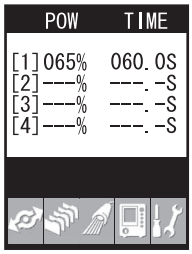
CHECK!

- If the password is wrong, the message "PASSWORD IS DIFFERENT" is displayed. In this case, click [OK] to redisplay the password entry field.
- If you have forgotten the password, turn the main power supply OFF and then back ON again with the EMISSION button held down.
  This clears the password setting.



Function Setting Mode - LOCK mode

The LCD screen displays the setting menus.



CH SET
Irradiation Conditions Setting Menu

I/O
External Device Setting Menu

BANK
Device Setup Change Setting (BANK) Menu

TOOL
Tool Setting Menu

SYSTEM
System Environment Setting Menu

● Irradiation Conditions Setting Menu

CH SET

This menu sets the irradiation conditions.

■ Selecting preset time irradiation/ unlimited irradiation p.3-5
■ Setting Pattern Irradiation p.3-6
■ Copying Irradiation Conditions p.3-9

● External Device Setting Menu

I/O

This menu sets control from external devices.

p.4-2

● Device Setup Change Setting (BANK) Menu

BANK

This menu sets banks.

■ Switching Banks p.3-12
■ Copying Banks p.3-12
■ Clearing Banks p.3-12
■ Enabling Bank Switching Input p.3-13

● Tool Setting Menu

TOOL

This menu sets useful tools such as power tuning.

■ Setting/Executing Power Tuning p.3-14
■ Displaying Irradiation Log Data p.3-18
■ Setting Cumulative Alarms p.3-19

● System Environment Setting Menu

SYSTEM

This menu sets the system environment.

■ Disabling the Irradiation Buttons p.3-22
■ Changing the Display Language p.3-21
■ Setting the I/O Signal Conditions p.3-21
■ Initializing Settings Data p.3-22
■ Checking System Information p.3-22

This menu sets/changes passwords.

p.3-20

This menu sets the buzzer volume.

p.3-21

The menu sets brightness and color of the LCD screen.

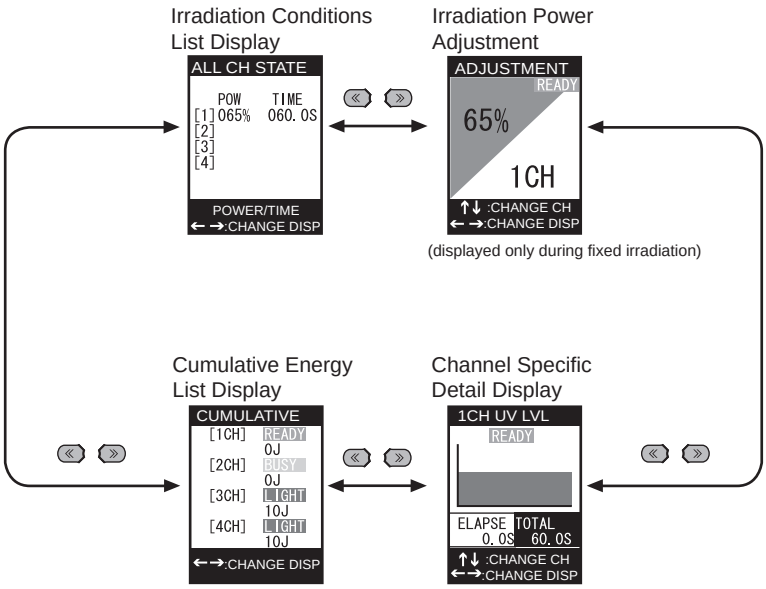
■ Setting/Canceling the ECO Mode p.3-23
■ Setting Colors p.3-23

This menu sets the conditions for communication with external devices.

p.4-9, p.4-10

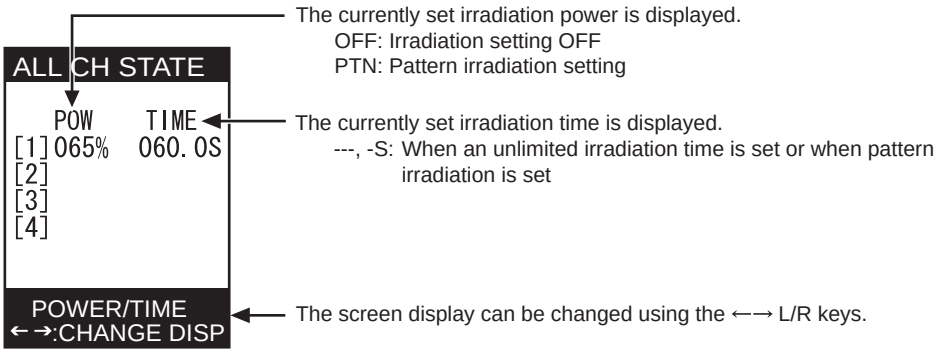
Operation-in-progress Mode - READY Mode

The LCD screen displays the irradiation information. The screen display order can be changed to counterclockwise or to clockwise by the « L key and » R key, respectively.



● Irradiation Conditions List Display

A list of irradiation times and head states of all channels is displayed.

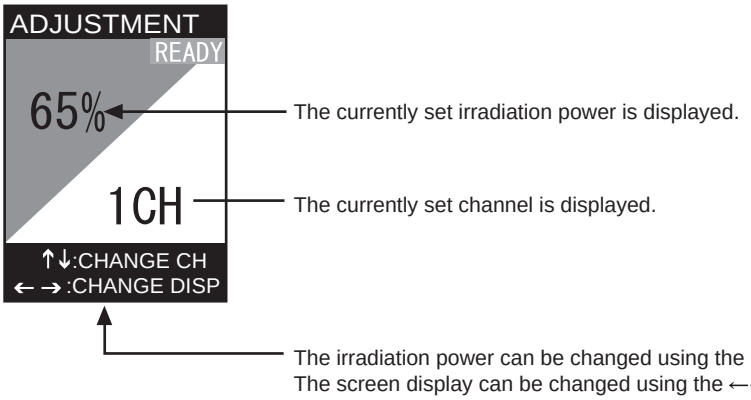

ALL CH STATE
POW TIME
[1] 065% 060.0S
[2]
[3]
[4]
POWER/TIME
←→:CHANGE DISP
The currently set irradiation power is displayed.
OFF: Irradiation setting OFF
PTN: Pattern irradiation setting
The currently set irradiation time is displayed.
---, -S: When an unlimited irradiation time is set or when pattern irradiation is set
The screen display can be changed using the ←→ L/R keys.

● Irradiation Power Adjustment

This menu changes the irradiation power.

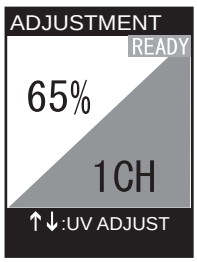
CHECK!

• The irradiation power can be adjusted only in constant irradiation.


ADJUSTMENT
READY
65%
1CH
↑↓:CHANGE CH
←→:CHANGE DISP
The currently set irradiation power is displayed.
The currently set channel is displayed.
The irradiation power can be changed using the ↑ ↓ UP/DOWN keys.
The screen display can be changed using the ←→ L/R keys.

Adjusting the irradiation power in the irradiation power adjustment screen

1. Select the channel whose irradiation power is to be adjusted using the key, and press the SET key to apply the setting.



The background is reversed, the irradiation power is displayed on a white background, and the mode changes to the adjustment mode.

CHECK!

• When the password function is enabled, the password must be entered.
p.2-11

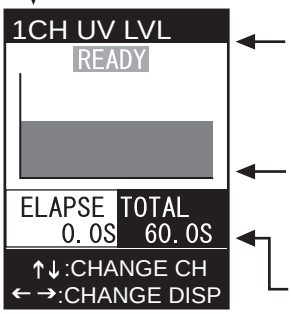
• Clicking the [CAN] (cancel) button at the password entry field returns the mode to the intensity power adjustment screen.

2. Adjust the irradiation power using the keys, and press the SET key to apply the setting.

Reversal of the background is restored to its original state, and the channel is displayed on a white background.

● Channel Specific Detail Display

This displays the irradiation pattern and progress in graph form.



Displays the channel shown as a graph.

The head state is displayed.
- READY: Irradiation is enabled.
- BUSY: Irradiation is disabled.
- LIGHT: Irradiation in progress
- OFF: Irradiation setting OFF

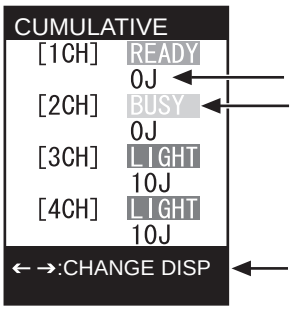
The currently set irradiation pattern is displayed in graph form.
Irradiation progress can be checked by color.
- Green: Irradiation not started
- Red: Irradiation completed

The elapsed time and total time of the currently set irradiation pattern are displayed.

The channel to be displayed can be changed using the ↑ ↓ UP/DOWN keys.
The screen display can be changed using the ←→ L/R keys.

● Cumulative Energy List Display

This displays a list of cumulative irradiation energies from the start of use of the head connected to the respective channels. The list is used for checking the life of the respective head.



The cumulative energy is displayed.

The head state is displayed.
- READY: Irradiation is enabled.
- BUSY: Irradiation is disabled.
- LIGHT: Irradiation in progress
- OFF: Irradiation setting OFF

The screen display can be changed using the ←→ L/R keys.

MEMO

Section 3
SETUP

LOCK Mode Setting Item List 3-2

Setting the Irradiation Conditions 3-4

- Setting Constant Irradiation Conditions 3-5
- Setting Pattern Irradiation 3-6
- Copying Irradiation Conditions 3-9

Device Setup Change Setting (Bank) 3-11

- Switching Banks 3-12
- Copying Banks 3-12
- Clearing Banks 3-12
- Enabling Bank Switching Input 3-13

Setting/Executing Power Tuning 3-14

Displaying Irradiation Log Data 3-18

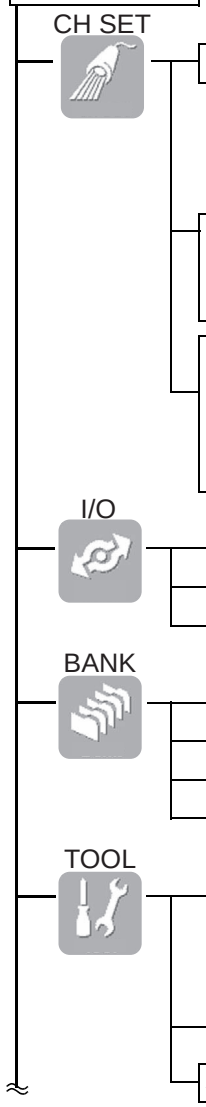
Setting Cumulative Alarms 3-19

Setting the System Environment 3-20

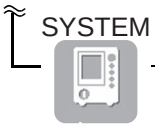
- Setting Passwords 3-20
- Setting the Buzzer Function 3-21
- Changing the Display Language 3-21
- Setting the I/O Signal Conditions 3-21
- Initializing Setting Data 3-22
- Checking System Information 3-22
- Disabling the Irradiation Buttons 3-22
- Setting the Display Method 3-23

LOCK Mode Setting Item List

The setting items of the LOCK mode are shown as follows:



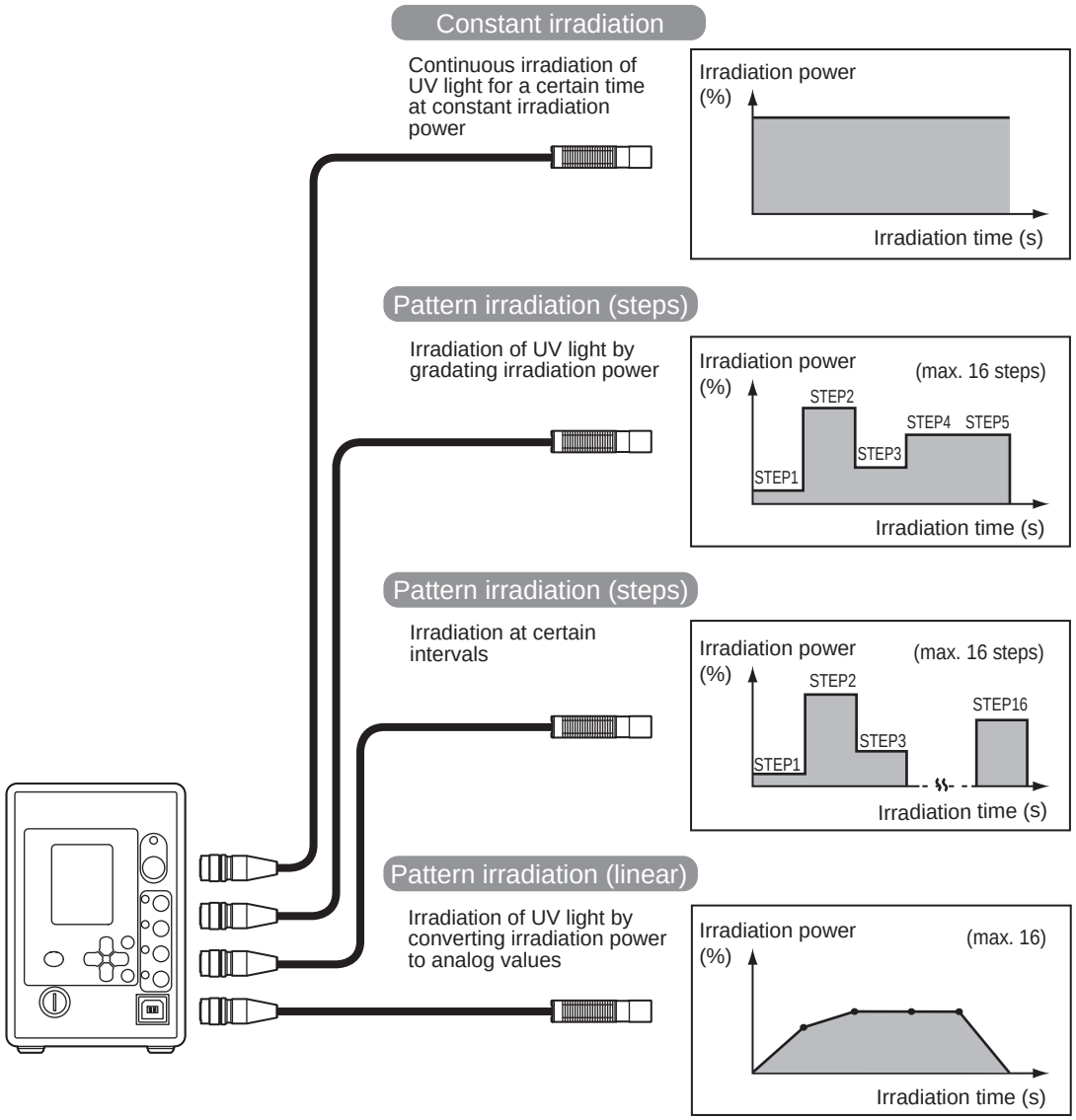
LOCK mode		Settings		Default Value	Option/Range	Pages
CH SET	1CH to 4CH	OFF		-	-	p.3-4
		LIGNT TIME	SETTING	-	-	p.3-5
			UNLIMITED	-	-	
		Pattern irradiation		-	01 to 16	p.3-6
	CH COPY	BATCH COPY		-	01 to 04 (copy source channel)	p.3-9
		SINGLE COPY		-	01 to 04 (copy source channel) 01 to 04 (copy destination channel)	p.3-9
	PATTERN EDIT	Patterns 01 to 16		-	(When no pattern is set) STEP, LINEAR (When the pattern setting is completed) CORRECT, CLEAR	p.3-6
I/O		I/O CONTROL		ALL CH	ALL CH, INDIVIDUALLY	p.4-2
		TERMINAL IN		SWITCH	SWITCH, CONTACT	
		EMERGENCY		SHORT	SHORT, OPEN	
BANK		CHANGE		BANK1	BANK1 to BANK16	p.3-12
		COPY		BANK1	BANK1 to BANK16	p.3-12
		CLEAR		BANK1	BANK1 to BANK16, ALL	p.3-12
		TERMINAL		OFF	OFF, ON	p.3-13
TOOL		POWER TUNING	ON/OFF	OFF	OFF, ON	p.3-14
			TEACH	(Displayed only when power tuning is set to ON)		
			EXECUTE	(Displayed only when power tuning is set to ON)		
		LOG DATA		-	-	p.3-18
	ALARM SET	1CH to 4CH	ON/OFF	OFF	OFF, ON	p.3-19



	Settings		Default Value	Option/Range	Pages
COMM PORT	DATA BIT		8BIT	8BIT, 7BIT	p.4-9
	PARITY		NON	NON, ODD, EVEN	
	STOP BIT		1BIT	1BIT, 2BIT	
	BAUD RATE		38400	9600A19200A38400A57600 A115200	
	DELIMITER		CR+LF	CR, LF, CR+LF	
	PASSWORD	ON/OFF	OFF		p.3-20
		CHANGE (SET)	(Displayed only when password is set to ON)		
	BUZZER		H	OFF, L, H	p.3-21
	LANGUAGE		-	JAPANESE, ENGLISH	p.3-21
OPTION	LIGHT OFF		TIME	TIME INPUT	p.3-21
	LOG DATA		OFF	OFF, ON	p.3-21
ALL CLEAR	SYSTEM DATA		-	(Initializes controller settings.)	p.3-22
	HEAD DATA		-		
	VERSION		-	(Displays controller version.)	p.3-22
BUTTON LOCK	EMISSION button		OFF	ON, OFF	p.3-22
	CH button		OFF	ON, OFF	
DISPLAY	ECO		OFF	ON, OFF	p.3-23
	COLOR		MARINE BLUE	MARINE BLUE, GRASS GREEN, ORANGE PEEL, STYLISH GRAY, SALMON PINK, NIGHTMARE	

Setting the Irradiation Conditions

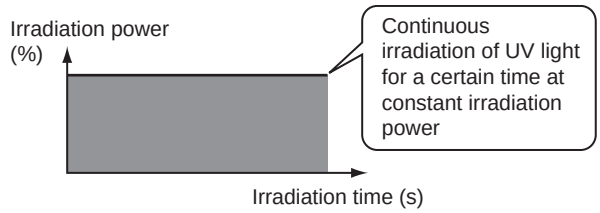
Simultaneous adhesion is available for multiple locations under differing conditions by setting the irradiation conditions.
Two ways of irradiation are provided: constant irradiation, which irradiates at constant power for a certain time, and pattern irradiation, which irradiates by gradating the power with a pattern setting of power and time.



CHECK! Be sure to set the channel, for which irradiation is not performed, to [OFF] in the LOCK mode by selecting -[CH SET] and then selecting each of the channels from [1CH to 4CH].

Setting Constant Irradiation Conditions

Irradiation power and time are set for the purpose of continually irradiating the UV light for a certain time at a constant irradiation intensity.


Irradiation power
(%)
Continuous irradiation of UV light for a certain time at constant irradiation power
Irradiation time (s)

Set the irradiation power and time.

Select preset time irradiation/unlimited irradiation.

Change to the RUN mode to irradiate with UV light.

■ Setting the irradiation power and time

Set the irradiation power and time in the LOCK mode top menu.

CHECK!

- For details on the settings, see Section 2, "Let's Try Irradiation".
p.2-4
- The irradiation power can also be adjusted in the irradiation power adjustment screen in the READY mode.
p.2-16

■ Selecting preset time irradiation/unlimited irradiation

▶ LOCK mode-[CH SET]-[1CH to 4CH]-[LIGNT TIME]

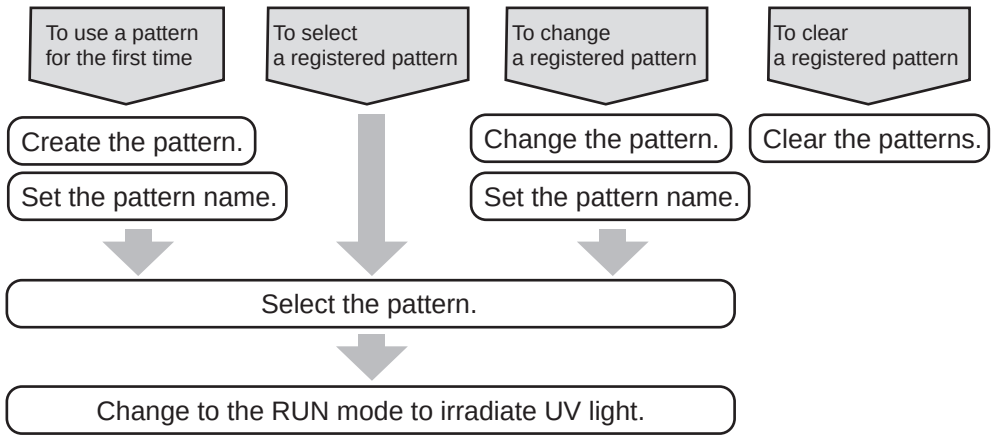
Setting value		Description
LIGNT TIME	SETTING (time setting)	Sets the irradiation time. Enables the irradiation time set in the LOCK mode top screen.
	UNLIMITED (unlimited)	Performs irradiation with the irradiation time set to unlimited. To stop irradiation, press the EMISSION button or the corresponding CH button.

CHECK!

For details on the settings, see Section 2, "Let's Try Irradiation".
p.2-4

Setting Pattern Irradiation

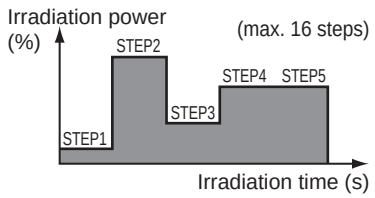
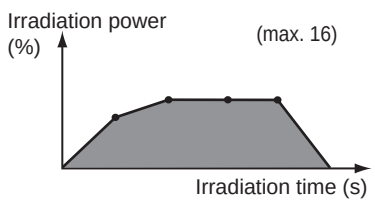
Irradiation patterns can be freely set as a combination of irradiation power and time. Optimal irradiation can be performed by creating and selecting patterns suited to the type of object and adhesion.


To use a pattern for the first time
To select a registered pattern
To change a registered pattern
To clear a registered pattern
Create the pattern.
Set the pattern name.
Change the pattern.
Set the pattern name.
Clear the patterns.
Select the pattern.
Change to the RUN mode to irradiate UV light.

■ Creating patterns

A maximum of 16 irradiation patterns can be created and registered.

▶ LOCK mode-[CH SET]-[PATTERN EDIT]-[PATTERN 1 to 16]

Setting value	Description	
STEP	Sets the irradiation power and time in units of steps. Interval irradiation can also be set by setting just a time with power set to 0.	
	Range: Irradiation power: 0 to 100% (in 1% steps) Total irradiation time: 000.0 to 999.9 (S)	
LINEAR	Sets the irradiation power and time on a continuous line in units of points.	
	Range: Irradiation power: 0 to 100% (in 1% steps) Total irradiation time: 000.0 to 999.9 (S)	

CHECK!

- Patterns 1 to 16 are common to all banks.
  About banks p.3-11
- For details on the settings, see Section 2, "Let's Try Irradiation".
  p.2-4

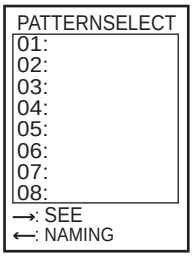
■ Pattern name setting

Names can be freely set for set patterns.

Pattern name setting

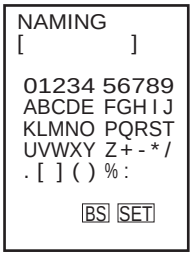
▶ LOCK mode-[CH SET]-[PATTERN EDIT]

1. Move the cursor to the target pattern using the keys, and press the key.



2. Select characters using the keys, and press the SET key.

Up to eight characters can be set.



3. Move the cursor to [SET] using the keys, and press the SET key.

The screen display returns to the pattern selection screen.

■ Selecting patterns

Select which pattern is to be used for the respective channel.

Patterns must already have been prepared in advance.
Creating patterns p.3-6

▶ LOCK mode-[CH SET]-[1CH to 4CH]-[PATTERN]

Setting value	Description
01 to 16	Select the irradiation pattern.

■ Changing patterns

The content of a set pattern can be changed.

▶ LOCK mode-[CH SET]-[PATTERN EDIT]-[PATTERN 1 to 16]-[CORRECT]

■ Clearing patterns

Clear the content of a set pattern.

▶ LOCK mode-[CH SET]-[PATTERN EDIT]-[PATTERN 1 to 16]-[CLEAR]

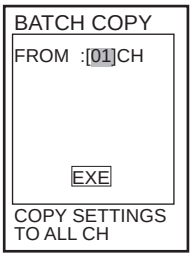
Copying Irradiation Conditions

Copy the irradiation conditions to another channel.

■ Batch copy

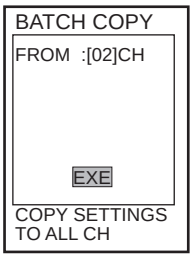
LOCK mode-[CH SET]-[CH COPY]-[BATCH COPY]

1. Move the cursor to the copy source using the keys, and press the SET key.



2. Set a channel using the keys, and press the SET key.

CHECK! Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

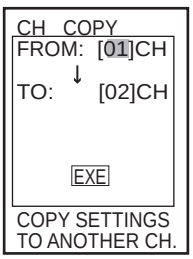


3. Move the cursor to [EXE] using the keys, and press the SET key.

■ Single copy

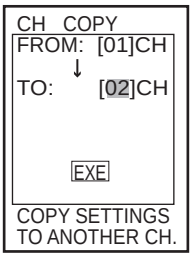
LOCK mode-[CH SET]-[CH COPY]-[SINGLE COPY]

1. Move the cursor to the copy source using the keys, and press the SET key.



2. Set a channel using the keys, and press the SET key.

CHECK! Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

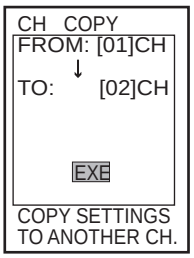


3. Move the cursor to the copy destination using the keys, and press the SET key.

4. **Set a channel using the keys, and press the SET key.**

Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

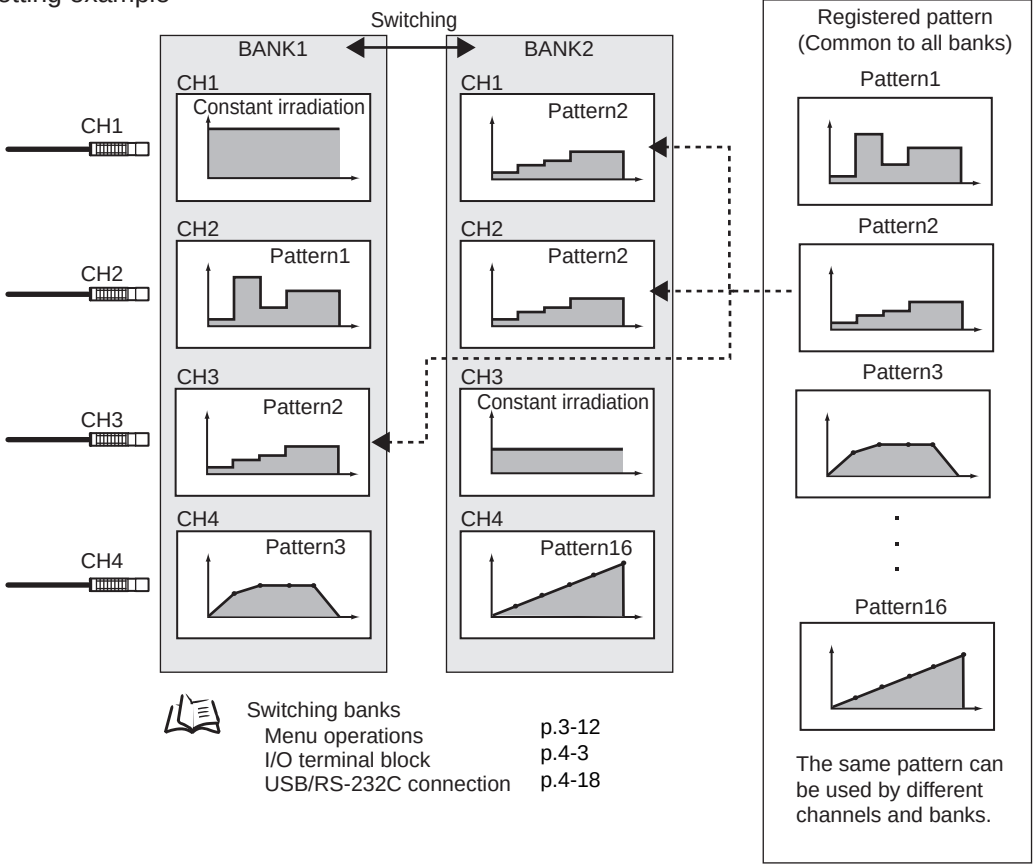
5. **Move the cursor to [EXE] using the keys, and press the SET key.**



Device Setup Change Setting (Bank)

Up to 16 types of irradiation methods can be stored in the ZUV, and a set of these methods is called a "bank". Banks can be changed from an external device when changing device setups.
The irradiation conditions of the respective channel are stored in the bank (the setting after CH SET).

<Setting example>



Switching banks
Menu operations p.3-12
I/O terminal block p.4-3
USB/RS-232C connection p.4-18

Switching Banks

Switch the currently selected bank to another bank.

CHECK!

Banks can also be switched from an external device.

• I/O terminal block p.4-3
• USB/RS-232C communication command p.4-14

▶ LOCK mode-[BANK]-[CHANGE]

Setting value	Description
CHANGE	Selects the target bank. Range: BANK1 to BANK16 (Default value: BANK1)

Copying Banks

Copy the settings of a selected bank to the current bank.

▶ LOCK mode-[BANK]-[COPY]

Setting value	Description
COPY	Selects the copy source bank. Range: BANK1 to BANK16 (Default value: BANK1)

Clearing Banks

Initialize the content of a bank.

CHECK!

Settings made by [SYSTEM] or [I/O] are not initialized.

▶ LOCK mode-[BANK]-[CLEAR]

Setting value	Description
CLEAR	Selects the target bank. Range: BANK1 to BANK16, ALL (Default value: BANK1)

Enabling Bank Switching Input

Enable/disable bank switching input from the I/O terminal on the controller rear.

▶ LOCK mode-[BANK]-[TERMINAL]

Setting value	Description
OFF	Disables bank switching input. (default value) CHECK! Be sure to set bank switching input to OFF unless the bank is changed using the I/O terminal.
ON	Enables bank switching input. CHECK! When the mode is switched to the READY mode with BANK0 to 3 on the I/O terminal set to OFF, bank 1 is switched to even if bank 2 to 16 is displayed. Before switching to the READY mode, set BANK0 to 3.

Setting/Executing Power Tuning

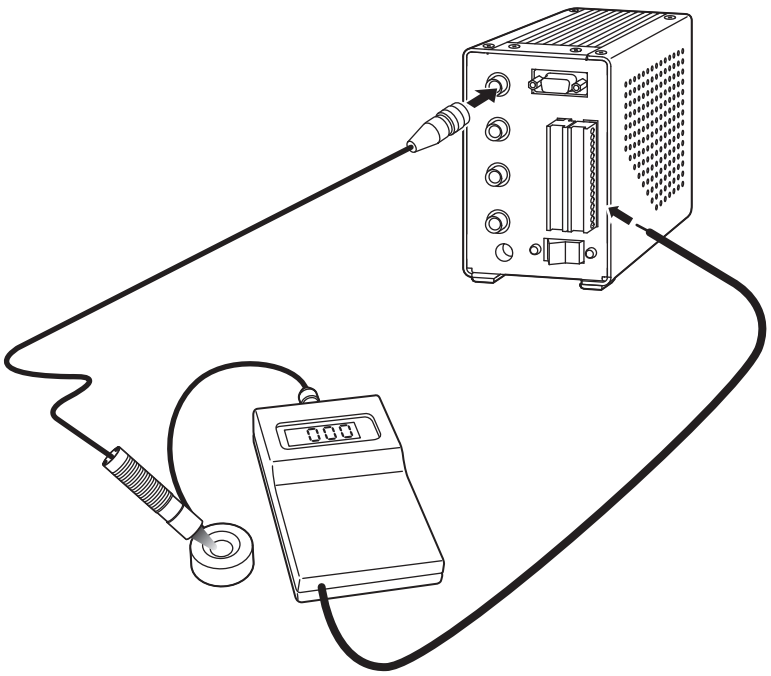
The "power tuning" function corrects the irradiation power according to the measurement result obtained by connecting a UV luxmeter to ZUV. The reference irradiation power and the measured intensity are registered in advance so that easy correction of the irradiation power can be made later at checkup.

CHECK! Execute power tuning in low-noise conditions.

■ Connecting the UV luxmeter

When setting for power tuning, the voltage output terminal of a commercially available UV luxmeter must be connected to the I/O terminal block (analog input).

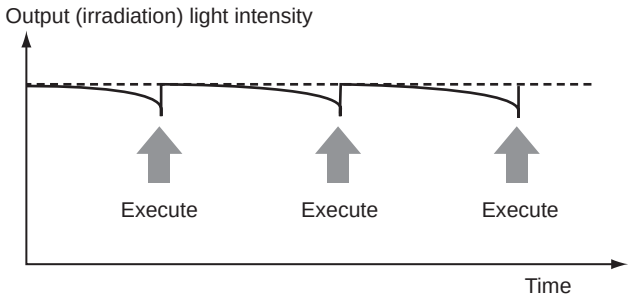
• I/O terminal block p.4-3
• Section 4 CONNECTING TO EXTERNAL DEVICES p.4-1



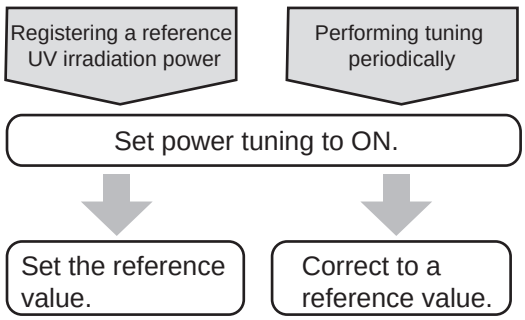
When selecting the UV luxmeter, pay attention to the following items:

- The received light level may be saturated depending on the type of the UV luxmeter because the power of the UV light, which is irradiated from the ZUV, is too strong. If this happens, insert a commercially available filter between the UV head and light receiving element of the UV luxmeter.
- Select a UV luxmeter with the voltage output function built-in.

Setting [POWER TUNING] to [ON] lowers the actual irradiation intensity when compared with the state of the [OFF] setting even if the same irradiation power is set.



● Flow chart of power tuning


Registering a reference UV irradiation power
Performing tuning periodically
Set power tuning to ON.
Set the reference value.
Correct to a reference value.

■ Setting power tuning to ON

Set power tuning.

▶ LOCK mode-[TOOL]-[POWER TUNING]-[ON/OFF]

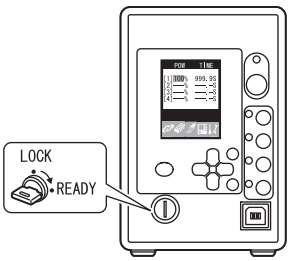
Setting value	Description
OFF	• Setting/execution of the reference value for power tuning are disabled. • The irradiation intensity at the same irradiation power is higher than that when power tuning is set to ON. (default value) • When OFF is selected, the power tuning reference value that was set when power tuning was set to ON is cleared.
ON	• Setting/execution of the reference value for power tuning are enabled. • The irradiation intensity at the same irradiation power is lower than that when power tuning is set to OFF.

■ Setting the reference value

The reference UV irradiation power and the measured intensity are registered as reference values.

▶ LOCK mode-[TOOL]-[POWER TUNING]-[ON]-[TEACH]

1. Turn the key switch to READY.



2. Move the cursor to [CHANNEL] using the ↑ ↓ keys, and press the SET key.

3. Set a target channel using the ↑ ↓ ← → keys, and press the SET key.

CHECK! Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

4. Move the cursor to [EXE] using the ↑ ↓ keys, and press the SET key.

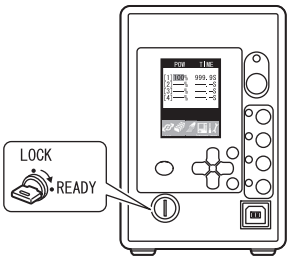
The intensity at that time is registered as a reference value.

■ Correcting to a reference value

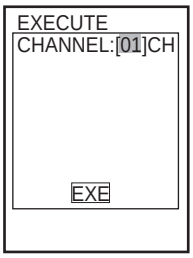
Tune the controller to the currently set reference value.

▶ LOCK mode-[TOOL]-[POWER TUNING]-[ON]-[EXECUTE]

1. Turn the key switch to READY.



2. Move the cursor to [CHANNEL] using the keys, and press the SET key.

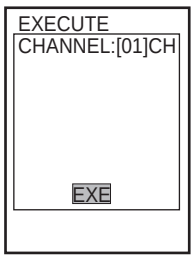


3. Set a target channel using the keys, and press the SET key.

CHECK!

Change the numeric values and number of digits by using the ↑ ↓ UP/DOWN keys and the ← → L/R keys, respectively.

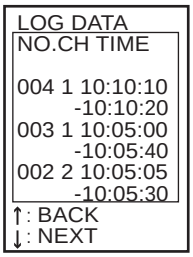
4. Move the cursor to [EXE] using the keys, and press the SET key.



Displaying Irradiation Log Data

When the irradiation log data management screen is enabled, up to 100 log data records are saved on the controller.
The following section describes how to display the irradiation log data.

▶ LOCK mode-[TOOL]-[LOG DATA]



● Loading log data to a personal computer

Irradiation log data saved on the controller can also be saved to a personal computer. Connect the controller to a personal computer by the USB or RS-232C cable, and load data by entering the required command on the personal computer.

LOGDATA command p.4-28

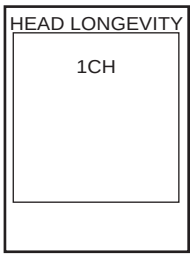
CHECK!

The irradiation log data saved on the controller is cleared when its power is turned OFF.

Setting Cumulative Alarms

The cumulative energy of each head is stored on controllers. The head life can be judged by setting thresholds to this energy value.
An alarm is displayed and an error is output when the cumulative energy of the head exceeds the threshold. (default value: OFF)

Cumulative alarm display



■ Setting the cumulative alarm output threshold

▶ LOCK mode-[TOOL]-[ALARM SET]-[1CH to 4CH]-[ON/OFF]

Setting value	Description
ON	Enables setting of the cumulative energy threshold. Range: 0.0 to 99999999.9
OFF	Disables setting of the cumulative energy threshold.

CHECK!

- Setting of cumulative energy is enabled only in the READY mode. Irradiated energy is not accumulated in the LOCK mode since irradiation is not performed.
- When LOCK mode- [SYSTEM] - [OPTION] - [LOG DATA] - [OFF] is selected, the cumulative alarm setting does not function.

Setting ready signals output conditions p.3-21

- After the head is replaced, initialize the cumulative energy value in the LOCK mode.

Initializing Setting Data p.3-22

Setting the System Environment

Setting Passwords

Set enable/disable of the password function, and set/change of the password.

▶ LOCK mode-[SYSTEM]-[PASSWORD]

Setting value	Description
OFF	Disables the password function. (default value) The previously set password is canceled.
ON	Enables the password function. The password can be set/changed.

■ Changing passwords

The initial password can be set or changed.

LOCK mode-[SYSTEM]-[PASSWORD]-[ON]-[CHANGE]
(When setting the initial password, LOCK mode-[SYSTEM]-[PASSWORD]-[ON]-[SET])

1. Move the cursor to the numerical value entry field using the key, and apply the settings by the SET key.

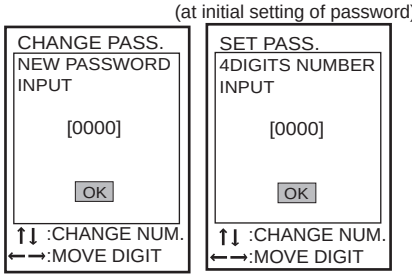
Digits that can be changed are displayed on a white background.

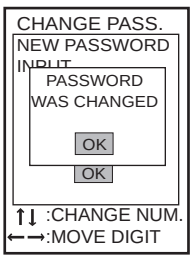
2. Change the numerical value using the keys and the digit using the keys, enter all four digits, and press the SET key to apply the setting.

3. Move the cursor to [OK] using the key, and press the SET key.

The message "PASSWORD WAS CHANGED" is displayed. Press [OK] by pressing the SET key.

(at initial setting of password)





Setting the Buzzer Function

Set the buzzer sound to notify start and end of adhesion irradiation.

▶ LOCK mode-[SYSTEM]-[BUZZER]

Setting value	Description
OFF	Sets the buzzer volume to OFF.
L	Sets the buzzer volume to LOW.
H	Sets the buzzer volume to HIGH. (default value)

Changing the Display Language

Set the display language of the LCD screen.

▶ LOCK mode-[SYSTEM]-[LANGUAGE]

Setting value	Description
JAPANESE	Displays menus in Japanese.
ENGLISH	Displays menus in English.

Setting the I/O Signal Conditions

■ Setting trigger signal input priority conditions

▶ LOCK mode-[SYSTEM]-[OPTION]-[LIGHT OFF]

Setting value	Description
TIME	Irradiation is continued with priority given to the preset time until the end time. (default value)
INPUT	The input signal is given priority to stop irradiation even within the preset time.

Timing charts p.4-8

■ Setting ready signals output conditions

▶ LOCK mode-[SYSTEM]-[OPTION]-[LOG DATA]

Setting value	Description
ON	Enables irradiation log data management, and returns the RDY signal 200 ms after irradiation ends.
OFF	Disables irradiation log data management, and returns the RDY signal immediately after irradiation ends. (default value)

Timing charts p.4-7

Initializing Setting Data

Return all bank settings and system settings to their factory settings.

CHECK!

All bank and system settings are initialized regardless of the currently selected bank No.

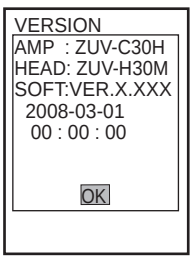
▶ LOCK mode-[SYSTEM]-[ALL CLEAR]

Setting value	Description
SYSTEM DATA	Initializes the bank and system setting data.
HEAD DATA	Cumulative irradiation energy and power warning data are saved on the controller. After the head is replaced, be sure to initialize this data.

Checking System Information

Display the version of the controller system.

▶ LOCK mode-[SYSTEM]-[VERSION]



Disabling the Irradiation Buttons

Disable the EMISSION button and CH button.

▶ LOCK mode-[SYSTEM]-[BUTTON LOCK]

Setting value		Description
EMISSION button	ON	Disables the EMISSION button.
	OFF	Enables the EMISSION button. (default value)
CH button	ON	Disables the CH button.
	OFF	Enables the CH button. (default value)

Setting the Display Method

■ Setting/Canceling the ECO Mode

Set the brightness of the LCD screen.

▶ LOCK mode-[SYSTEM]-[DISPLAY]-[ECO]

Setting value	Description
ON	Sets the "Eco" mode. The "Eco" screen darkens when three minutes continue without any operation. (default value)
OFF	Cancels the "Eco" mode setting.

■ Setting Colors

Set the background color of the LCD screen.

▶ LOCK mode-[SYSTEM]-[DISPLAY]-[COLOR]

Setting value	Description
MARINE BLUE	Sets the color to MARINE BLUE. (default value)
GRASS GREEN	Sets the color to GRASS GREEN.
ORANGE PEEL	Sets the color to ORANGE PEEL.
STYLISH GRAY	Sets the color to STYLISH GRAY.
SALMON PINK	Sets the color to SALMON PINK.
NIGHTMARE	Sets the color to NIGHTMARE.

MEMO

Section 4
CONNECTING TO EXTERNAL DEVICES

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Connection by an I/O Terminal Block

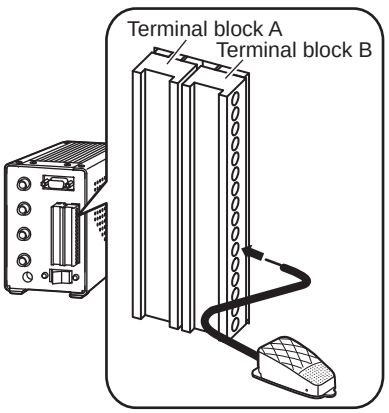
Connection and Communication Settings

This section describes how to connect the controller to the external device using the I/O terminal block.

CHECK! Before connecting/disconnecting the external device, make sure that the controller is turned OFF.

■ Connection by an I/O terminal block

1. Insert the power cable of the external device into the I/O terminal block of the controller.



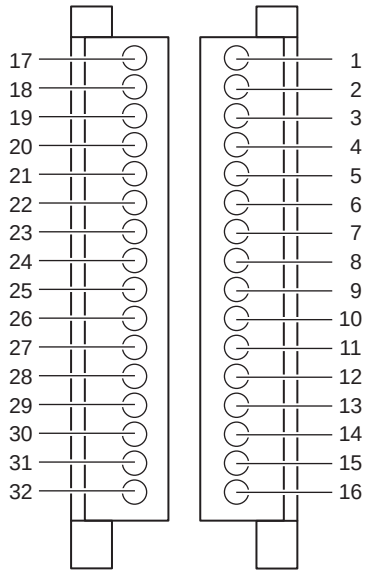
● Setting the communication conditions

Make the settings for controlling the controller from external devices.

▶ LOCK mode [I/O]

Setting value		Range
I/O CONTROL (I/O control)	ALL CH (batch control)	Select ALL to control irradiation start/stop of all channels at once. Selecting [ALL CH] controls irradiation start/stop of all channels using the signal input (TRG1) to CH1. (default value)
	INDIVIDUALLY (individual control)	Select INDIVIDUALLY to control irradiation start/stop of the respective channel using the signal inputs (TRG1 to TRG4) for each of the channels.
TERMINAL IN (input contact)	SWITCH (non-contact)	Select SWITCH to enter the open-collector outputs., etc. of the transistor. (default value)
	CONTACT (contact)	Select CONTACT to enter the contact output of the foot switch, etc. The response of trigger input is slower than that of SWITCH because the chattering time is taken into consideration. The input detection time is also longer.
EMERGENCY (emergency stop)	SHORT	All operations on UV irradiation for all channels stop when there is a short-circuit in emergency stop input. (default value)
	OPEN	All operations on UV irradiation for all channels stop when there is an open-circuit in the emergency stop input.

● I/O terminal pin assignments



CHECK!

Pay attention to the following points regarding the electric wire used for the terminal block:

- The size of the recommended cross section is as follows:
  Numbers 16, 31, and 32: 1.00 to 1.50 mm^2
  Other than the above: 0.10 to 1.50 mm^2
- The stripped cable length is approximately 7 mm.

•Terminal block A

	Indication	I/O	Signal Name
17	RDY1	Output	Ready output CH1
18	RDY2	Output	Ready output CH2
19	RDY3	Output	Ready output CH3
20	RDY4	Output	Ready output CH4
21	TRGOUT1	Output	Unused
22	TRGOUT2	Output	Unused
23	TRGOUT3	Output	Unused
24	TRGOUT4	Output	Unused

	Indication	I/O	Signal Name
25	UVON	Output	Output during UV irradiation
26	ERROR	Output	Error output
27	COMOUT	—	Output COM
28	NC	—	No connection
29	NC	—	No connection
30	NC	—	No connection
31	+24V	—	+24V power supply input
32	GND	—	24V input GND

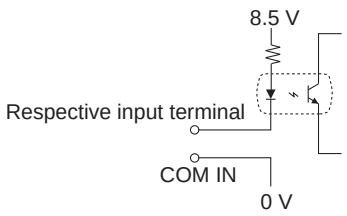
•Terminal block B

	Indication	I/O	Signal Name
1	AIN1	Input	0 to 5V analog input 1
2	AIN2	Input	Unused
3	AIN3	Input	Unused
4	AIN4	Input	Unused
5	AG	—	Analog input GND
6	TRG1	Input	UV irradiation start/end input CH1
7	TRG2	Input	UV irradiation start/stop input CH2
8	TRG3	Input	UV irradiation start/stop input CH3

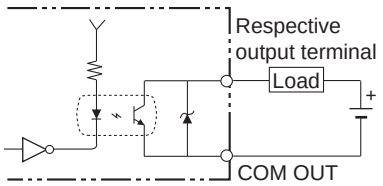
	Indication	I/O	Signal Name
9	TRG4	Input	UV irradiation start/stop input CH4
10	BANK0	Input	Bank switching input 0
11	BANK1	Input	Bank switching input 1
12	BANK2	Input	Bank switching input 2
13	BANK3	Input	Bank switching input 3
14	EMGCY	Input	Input of emergency stop
15	COMIN	—	0V (input COM)
16	FG	—	Frame GND

● Internal specifications

<Input specifications>

Internal circuit diagram	

<Output specifications>

Output voltage	12 to 24 VDC ±10%
Load current	45 mA or smaller
ON residual voltage	2 V or smaller
OFF leakage current	0.1 mA or smaller
Internal circuit diagram	

● I/O signals

<Input signals>

Terminal Block	No.	Signal Name	Functions
B	1	0 to 5V analog input	Connect this terminal to the analog output of the external power measurement device when using the power tuning function.
	5	Analog input GND	Connect this terminal to the analog output GND of the external power measurement device when using the power tuning function.
	6, 7, 8, 9	UV irradiation start/ stop input	This is the UV light irradiation start/stop trigger. Batch control: • CH1 is used as an input terminal of the UV irradiation start signal. • UV irradiation starts from all channels, which are in the UV irradiation standby mode, according to the set irradiation conditions when the UV irradiation start signal is input to the CH1 terminal while the ready output of CH1 is ON. Individual control: • With respect to channels CH1 to CH4, UV irradiation starts from the channel to which the UV irradiation start signal is input according to the set irradiation conditions.
	10, 11, 12, 13	Bank switching input	This input switches banks. (*)

Terminal Block	No.	Signal Name	Functions
	14	Emergency stop input	Stops UV light irradiation in an emergency. Set the conditions for enabling emergency stop input at [I/O]-[EMERGENCY]. To return from the emergency stop state, set the terminal to disable.
	31	+24V power supply input	This is the power supply for the interface with external devices. For the connection to GND, make sure that the connection is made to the exclusive GND (32).

*: The terminals of BANK0 to BANK3 are input as follows according to the bank No. to switch to.

Bank No.	BANK3 (terminal 13)	BANK2 (terminal 12)	BANK1 (terminal 11)	BANK0 (terminal 10)
1	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	ON
3	OFF	OFF	ON	OFF
4	OFF	OFF	ON	ON
5	OFF	ON	OFF	OFF
6	OFF	ON	OFF	ON
7	OFF	ON	ON	OFF
8	OFF	ON	ON	ON
9	ON	OFF	OFF	OFF
10	ON	OFF	OFF	ON
11	ON	OFF	ON	OFF
12	ON	OFF	ON	ON
13	ON	ON	OFF	OFF
14	ON	ON	OFF	ON
15	ON	ON	ON	OFF
16	ON	ON	ON	ON

CHECK!

Bank switching input from the I/O terminal block must be set to enabled in advance.

Enabling Bank Switching Input p.3-13

<Output signals>

Terminal Block	No.	Signal Name	Functions
A	17, 18, 19, 20	Ready output	The ready output is generated when each of the channels from CH1 to CH4 is in the UV irradiation standby mode.
	25	UV irradiation in progress output	This signal is output when any or all of the channels from CH1 to CH4 is (are) irradiating UV light.
	26	Error output	This signal is generated when an error occurs. Error Messages and Countermeasures p.5-3

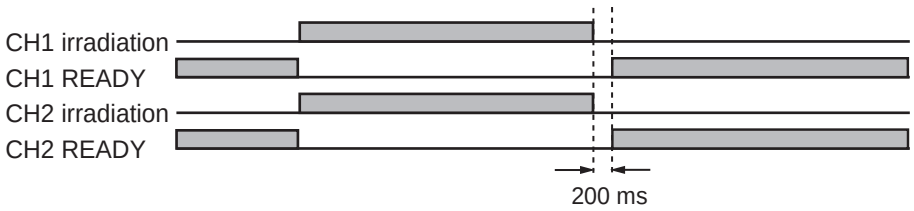
Timing Charts

The following shows the timing charts when communication is performed with external devices.

■ Ready output/display

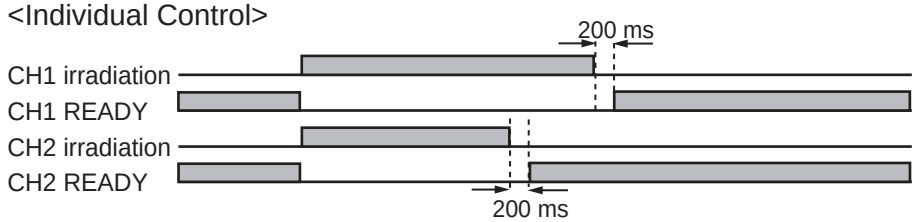
Ready output turns ON when the controller is ready for irradiation.

<Batch Control>



- The response time is within 200 ms of the change in state of the ready output signal.
- The ready output of all channels turns ON after irradiation of all channels on the irradiation target (other than OFF) ends.
- The ready output signal is always OFF for channels whose irradiation setting is OFF.

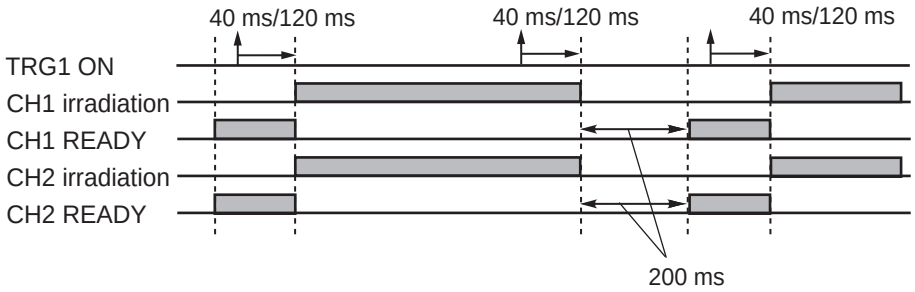
<Individual Control>



- The response time is within 200 ms of the change in state of the ready output signal.
- The ready output of the target channel turns ON after the irradiation of the target channel ends.
- The ready output signal is always OFF for channels whose irradiation setting is OFF.

■ Channel 1 irradiation terminal input (batch control)

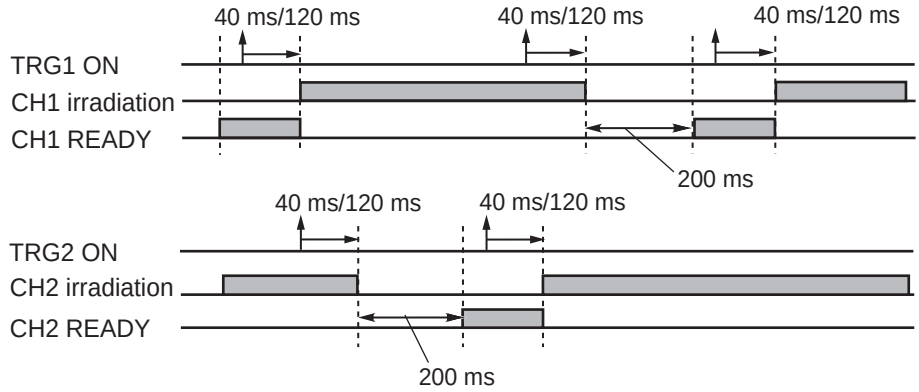
This input starts/stops UV irradiation of all channels.



- The input time is 40 ms and 120 ms when SWITCH and CONTACT are set, respectively.
- Irradiation starts only when the ready output of all channels turns ON when this signal is input.
- Irradiation of all channels stops when irradiation is in progress for any one of the channels.

■ Channels 1 to 4 irradiation terminal input (individual control)

This input starts/stops the irradiation of each of the channels from 1 to 4.



- The input time is 40 ms and 120 ms when SWITCH and CONTACT are set, respectively.
- Irradiation starts when the ready output of the target channel turns ON. (Otherwise, irradiation of the target channel stops).

CHECK!

Control action is as follows when irradiation log data management is disabled.

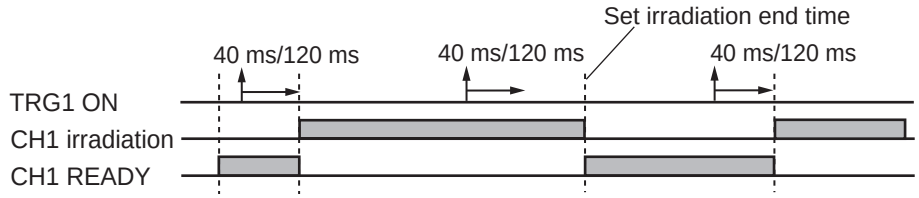
Note, however, that the input time is 120 ms or more when CONTACT is set.

Setting ready signals output conditions p.3-21

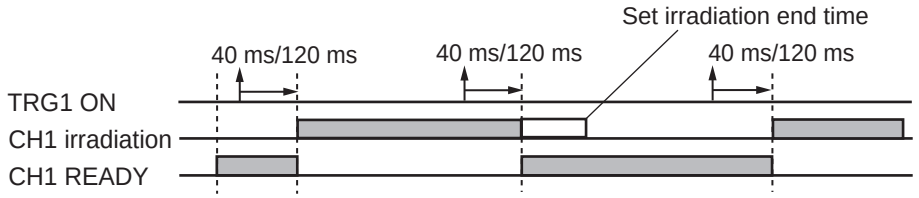
■ Trigger signal input priority conditions

Select which of preset time or interrupt input signal to give priority to for trigger signal input.

<When priority is set to time>



<When priority is set to interrupt input signal>



Setting trigger signal input priority conditions p.3-21

Connection by USB/RS-232C

Connection and Communication Settings

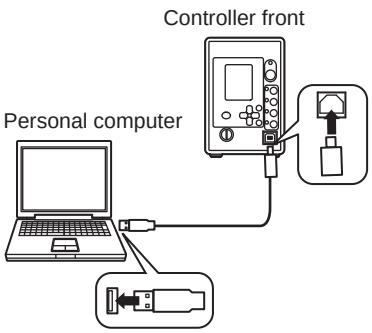
This section describes how to connect the controller to an external device using the USB/RS-232C cable.

CHECK! Before connecting/disconnecting the external device, make sure that the controller is turned OFF.

■ USB connection

1. Plug one end of the USB cable into the USB port of the controller.

2. Plug the other end of the USB cable into the USB port of the external device.



● Setting the communication specifications

This section describes how to set the USB communication settings.
Match the communication specifications of the ZUV to those of the external device.

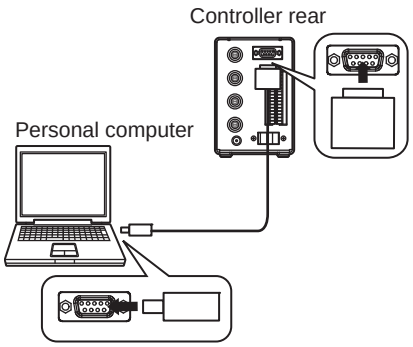
▶ LOCK mode-[SYSTEM]-[COMM PORT]

Setting value	Range
DATA BIT	Not used for USB connection (The setting is ignored).
PARITY	
STOP BIT	
BAUD RATE	Set to 115200.
DELIMITER	CR, LF, CR+LF (default: CR+LF)

■ RS-232C connection

1. **Plug one end of the RS-232C cable into the RS-232C connector of the controller.**

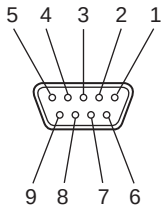
2. **Plug the other end of the RS-232C cable into the RS-232C connector of the external device.**



● Connector pin assignments

The D-SUB9 female pin is used for the RS-232C connector.
Prepare a compatible connector.

Recommended part: XM2A-0901 (plug)
XM2S-0911 (hood)



Pin No.	Signal Name	Description
1	FG (GND)	Protective ground
2	SD (TXD)	Send data
3	RD (RXD)	Receive data
4	NC	Not connected
5	NC	Not connected
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
9	SG (GND)	Signal ground

● Setting the communication specifications

Set the RS-232C communications specifications.
Match the communication specifications of the ZUV to those of the external device.

▶ LOCK mode-[SYSTEM]--[COMM PORT]

Setting value	Range
DATA BIT	8BIT, 7BIT (default value: 8BIT)
PARITY	NONE, ODD, EVEN (default value: NONE)
STOP BIT	1BIT, 2BIT (default value: 1BIT)
BAUD RATE	9600, 19200, 38400, 57600, 115200 (default value: 38400)
DELIMITER	CR, LF, CR+LF (default: CR+LF)

USB Driver

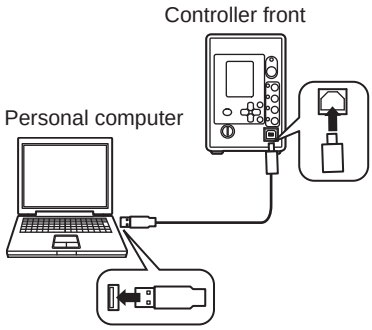
To establish a connection between the personal computer and the controller by the USB interface, the USB driver must be installed on a personal computer.

CHECK!

- The exclusive USB driver must be installed only when the controller is connected to the personal computer for the first time. From the second connection onwards, the USB driver is automatically recognized and does not need to be re-installed.
- To install the USB driver, log on as an Administrator or a user with system access rights.
- The error message "Failed to pass the Windows logo test" is sometimes displayed at installation of the USB driver. Press the [Continue] button to continue with the installation.

1. Turn ON your PC and start up Windows.

2. Connect the controller to the personal computer by the USB cable.



"Found New Hardware" will be displayed on the Windows tool bar, and the [New Hardware Detection Wizard] dialog box will appear.

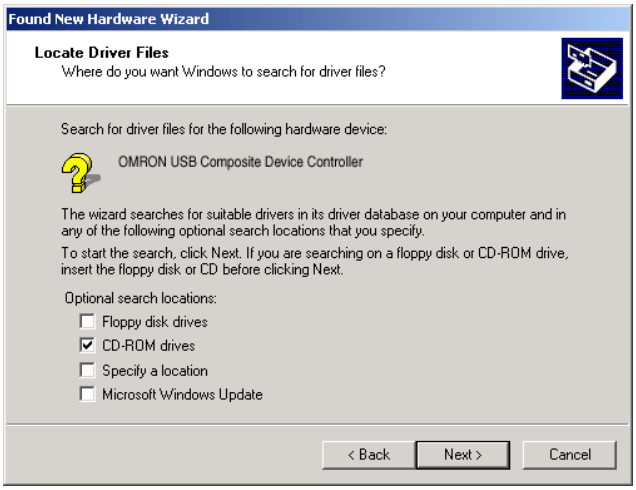
Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

3. **Click the [Next>] button.**

4. **Select the [Search for a suitable driver for my device (recommended)] radio button, and click the [Next>] button.**

Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
OMRON USB Composite Device Controller
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

5. **Select the [CD-ROM drives] checkbox, and click the [Next>] button.**

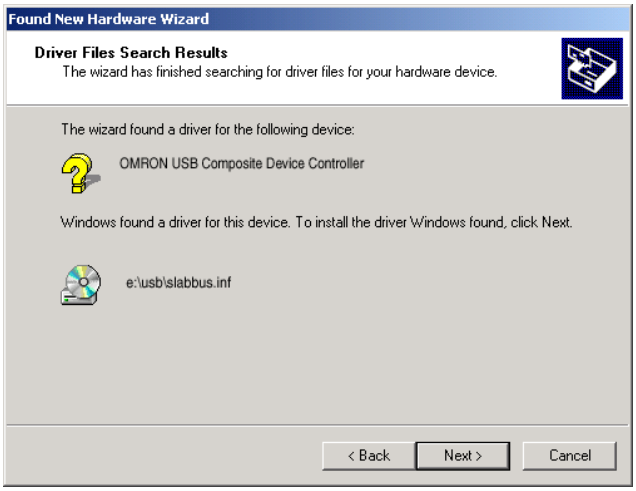

Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
OMRON USB Composite Device Controller
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

CHECK!

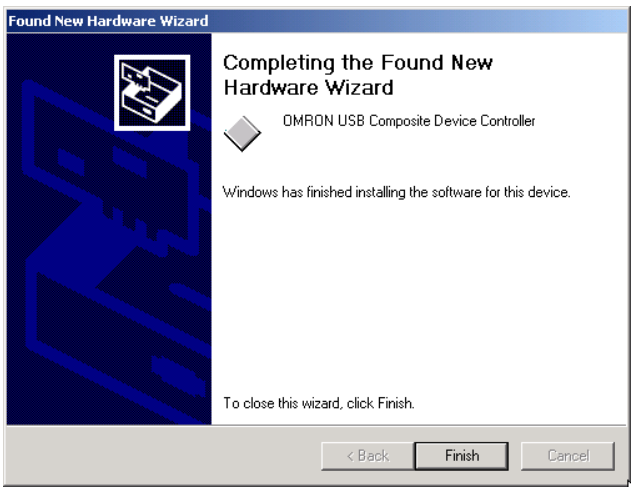
In the event that the controller is not automatically detected:
Click the [Browse] button and select the [USB] folder on the CD-ROM.

6. Make sure that the suitable driver has been detected, and click the [Next>] button.

Installation begins.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
OMRON USB Composite Device Controller
Windows found a driver for this device. To install the driver Windows found, click Next.
e:\usb\slabbus.inf
< Back
Next >
Cancel

When installation completes, the completion message is displayed.


Found New Hardware Wizard
Completing the Found New Hardware Wizard
OMRON USB Composite Device Controller
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

7. Click the [Finish] button.

The same screen in step 2 is displayed. Repeat the above procedure.

This completes installation of the USB driver.

Communication Commands

CHECK!

To communicate with an external device, switch the controller to the READY mode. In the LOCK mode, a communication cannot be established with the external device.

■ Non-procedural command list

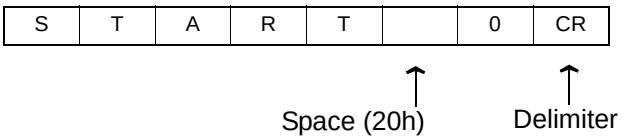
Command Name	Details	Reference Pages
START	Starts irradiation of UV light.	p.4-16
STOP	Stops irradiation of UV light.	
BANKGET	Obtains the bank No.	p.4-17
BANKSET	Switches banks.	p.4-18
DATASAVE	Saves the setting data to flash memory in the controller.	p.4-19
BANKLOAD	Loads bank data.	p.4-20
BANKSAVE	Saves bank data.	
SYSLOAD	Loads system data.	p.4-21
SYSSAVE	Saves system data.	
PATNGET	Obtains irradiation patterns.	p.4-22
PATNSET	Sets irradiation patterns.	p.4-23
PNAMEGET	Obtains irradiation pattern names.	p.4-24
PNAMESET	Sets irradiation pattern names.	p.4-25
DATAGET	Obtains the irradiation conditions of the respective channel.	p.4-26
DATASET	Sets the irradiation conditions of the respective channel.	p.4-27
LOGDATA	Obtains irradiation log data.	p.4-28
ACCUMGET	Obtains the cumulative energy.	p.4-29
SYSGET	Obtains system data.	p.4-30
SYSSET	Sets system data.	p.4-32
CALIBGET	Sets the reference value for power tuning.	p.4-34
CALIBSET	Executes power tuning.	
VERGET	Obtains system version information.	p.4-35
HDATACLR	Initializes the cumulative irradiation energy and power tuning data saved on the controller.	p.4-36

■ Command basic format

● Command format

The non-procedural command format is as follows:

Example: UV irradiation start command START command



CHECK!

- Enter a space (20h) between a command and an argument, or between arguments.
- A delimiter, which is determined according to the communication condition settings, is attached at the end of a command.

● Response format

The non-procedural command response format is as follows:

- In the event that a command is successfully executed:

O	K	CR

- In the event that a command is not executed successfully, or the command is not set properly:

E	R	CR

CHECK!

- A delimiter, which is determined according to the communication condition settings, is attached at the end of a response.
- A command error occurs and ER is returned when an invalid command is entered, a value outside a parameter range is entered, or the number of input parameters exceeds the allowable range.
- A command error occurs, and ER is returned when irradiation is being performed on any of the channels. (excluding the START/STOP commands)
- "Reply details" is indicated only when command execution completes successfully, and is described for each of the command format descriptions.

■ Details of respective command

START/STOP commands

UV light irradiation is started by the START command and is stopped by the STOP command on the specified channel. Setting the <channel No.> to 0 starts/stops irradiation for all heads at once starting with the irradiation standby head.

CHECK!

Commands can be received during irradiation.

Command
- **START <Channel No.>** Delimiter
- **STOP <Channel No.>** Delimiter

Response
OK Delimiter

(1) Parameter description

The following parameter can be set by the START and STOP commands:

Parameter	Setting Range/Output Range
Channel No.	0: Irradiation start/stop of all channels at once 1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4

(2) Command/response examples

The following shows an example of this command:

START 0 Delimiter ← Start of batch UV irradiation
STOP 0 Delimiter ← Stop of batch UV irradiation
START 1 Delimiter ← Start of irradiation on channel 1
STOP 1 Delimiter ← Stop of irradiation on channel 1

The following shows an example of a response to this command:

OK Delimiter ← Command execution ends successfully.

BANKGET command

This command obtains the currently set bank No.

Command **BANKGET** Delimiter

Response **<Bank No.>** Delimiter
OK Delimiter

(1) Parameter description

The following parameter can be obtained by the BANKGET command:

Parameter	Setting Range/Output Range
Bank No.	1 to 16: BANK1 to BANK16

(2) Command/response examples

The following shows an example of this command:

BANKGET Delimiter ← The bank No. is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

16 Delimiter ← BANK 16 is set.
OK Delimiter

BANKSET command

This command switches banks.

Command **BANKSET <Switch destination bank No.>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameter can be set by the BANKSET command:

Parameter	Setting Range/Output Range
Switch destination bank No.	1 to 16: BANK1 to BANK16

(2) Command/response examples

The following shows an example of this command:

BANKSET 5 Delimiter ← Bank 5 is switched to.

The following shows an example of a response to this command:

OK Delimiter ← Command execution ends successfully.

DATASAVE command

This command saves the setting data to the flash memory in the controller.

All settings will be deleted if you turn the power OFF without saving the data.
Setting data can also be saved by menu operations without using commands.
Turn the key switch on the controller front, and change the LOCK mode to the READY mode. The save confirmation message is displayed. The save confirmation message is displayed only when the settings have been changed. Otherwise, it is not displayed.

Command **DATASAVE** Delimiter

Response **OK** Delimiter

(1) Parameter description

No parameters are provided for the DATASAVE command.

(2) Command/response examples

The following shows an example of this command:

DATASAVE Delimiter ← Setting data in flash memory is saved.

The following shows an example of a response to this command:

OK Delimiter ← Command execution ends successfully.

BANKLOAD/BANKSAVE commands

Specified bank data is loaded by the BANKLOAD command and saved by the BANKSAVE command. Confirm the [READY] response after the command is sent to perform file send/receive operations using the tools provided by the personal computer, (for example, from Hyper Terminal) by XMODEM. The [OK] response is returned upon successful completion of send/receive.

Command
- **BANKLOAD <Bank No.>** Delimiter
- **BANKSAVE <Bank No.>** Delimiter

Response
OK Delimiter

(1) Parameter description

The following parameter can be set by the BANKLOAD and BANKSAVE commands:

Parameter	Setting Range/Output Range
Bank No.	1 to 16: BANK1 to BANK16

(2) Command/response examples

The following shows an example of this command:

BANKLOAD 5 Delimiter ← The settings of BANK5 are loaded.
BANKSAVE 5 Delimiter ← The settings of BANK5 are saved.
BANKLOAD 6 Delimiter ← The settings of BANK6 are loaded.
BANKSAVE 6 Delimiter ← The settings of BANK6 are saved.

The following shows an example of a response to this command:

OK Delimiter ← Command execution ends successfully.

SYSLOAD/SYSSAVE commands

System data is loaded by the SYSLOAD command and saved by the SYSSAVE command. Confirm the [READY] response after the command is sent to perform file send/receive operations using the tools provided by the personal computer, (for example, from Hyper Terminal) by XMODEM. The [OK] response is returned upon successful completion of send/receive.

CHECK!

The language setting cannot be loaded by the SYSLOAD command.

Command

- **SYSLOAD** Delimiter
- **SYSSAVE** Delimiter

Response

OK Delimiter

(1) Parameter description

No parameters are provided for the SYSLOAD and SYSSAVE commands.

(2) Command/response examples

The following shows an example of this command:

SYSLOAD <Delimiter>	← The system data is loaded.
SYSSAVE <Delimiter>	← The system data is saved.

The following shows an example of a response to this command:

OK <Delimiter>	← Command execution ends successfully.

PATNGET command

This command obtains display type-specific and step-specific irradiation power and time for from the irradiation pattern settings.

Command **PATNGET <Pattern No.>** Delimiter

Response **<Type><STEP1 level><STEP1 time><STEP2 level><STEP2 time> ... <STEP16 level><STEP16 time>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the PATNGET command:

Parameter	Setting Range/Output Range
Pattern No.	1 to 16
Type	0: Step type 1: Linear type
STEP xx (xx=1 to 16) level	0 to 100 (%)
STEP xx (xx=1 to 16) time	0 to 9999 (*0.1s)

(2) Command/response examples

The following shows an example of this command:

PATNGET 5 Delimiter ← Irradiation pattern 5 settings are obtained.
PATNGET 6 Delimiter ← Irradiation pattern 6 settings are obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

1, 10, 15, 25, 300, 60, 1000, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 Delimiter
OK Delimiter

← Irradiation pattern 5 includes the pattern irradiation (linear) settings for three steps.
The irradiation power and time of the respective steps are; STEP1: 10%, 1.5 seconds, STEP2: 25%, 30 seconds, and STEP3: 60%, 100 seconds.

0, 20, 100, 40, 15, 60, 200, 80, 400, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 Delimiter
OK Delimiter

← Irradiation pattern 6 includes the pattern irradiation (step) settings for four steps.
The irradiation power and time of the respective steps are; STEP1: 20%, 10 seconds, STEP2: 40%, 1.5 seconds, STEP3: 60%, 20 seconds, and STEP4: 80%, 40 seconds.

CHECK! The 33 data items are always returned as a set. 0 is returned for levels and times that are not registered.

PATNSET command

This command sets the display type-specific and step-specific irradiation power and time for the respective irradiation pattern.

Command **PATNSET <Pattern No.> <Type> <STEP1 level> <STEP1 time> <STEP2 level> <STEP2 time> ... <STEP16 level> <STEP16 time>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameters can be set by the PATNSET command:

Parameter	Setting Range/Output Range
Pattern No. (mandatory)	1 to 16
Type (mandatory)	0: Step type 1: Linear type
STEP xx (xx=1 to 16) level	0 to 100 (%)
STEP xx (xx=1 to 16) time	0 to 9999 (*0.1s)

The PATNSET command is used to enter only steps to be set. The level and time of steps that are not entered are set to "0". Also, names other than those which are optionally obtained will not be obtained.

(2) Command/response examples

The following shows an example of this command:

PATNSET 5 1 10 15 25 300 60 1000 Delimiter ← Irradiation pattern 5 includes the pattern irradiation (linear) settings for three steps. The irradiation power and time of the respective steps are; STEP1: 10%, 1.5 seconds, STEP2: 25%, 30 seconds, and STEP3: 60%, 100 seconds.

PATNSET 6 0 20 100 40 15 60 2000 80 4000 Delimiter ← Irradiation pattern 6 includes the pattern irradiation (step) settings for four steps. The irradiation power and time of the respective steps are; STEP1: 20%, 10 seconds, STEP2: 40%, 1.5 seconds, STEP3: 60%, 200 seconds, and STEP4: 80%, 400 seconds.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

PNAMEGET command

This command obtains irradiation pattern names. Only set irradiation pattern names are returned.

Command **PNAMEGET <Pattern No.>** Delimiter

Response **<Pattern name>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the PNAMEGET command:

Parameter	Setting Range/Output Range
Pattern No.	1 to 16
Pattern name	CCCCCCCC: 8 single-byte alphanumeric characters

(2) Command/response examples

The following shows an example of this command:

PNAMEGET 1 Delimiter ← The name of irradiation pattern 1 is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

Channel 1 Delimiter ← The name of this irradiation pattern is channel 1.
OK Delimiter

PNAMESET command

This command sets irradiation pattern names.

Command **PNAMESET <Pattern No.> <Pattern name>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameters can be set by the PNAMESET command:

Parameter	Setting Range/Output Range
Pattern No.	1 to 16
Pattern name	CCCCCCCC: 8 single-byte alphanumeric characters

(2) Command/response examples

The following shows an example of this command:

PNAMESET 1 Channel 1 Delimiter ← The pattern name of irradiation pattern 1 is set to channel 1.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

DATAGET command

This command obtains the irradiation conditions of the respective channel.

Command **DATAGET <Channel No.> <Parameter No.>** Delimiter

Response **<Obtained data>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the DATAGET command:

Parameter	Setting Range/Output Range	
Channel No.	0: Channel 1 1: Channel 2 2: Channel 3 3: Channel 4	
Parameter No.	32: Irradiation mode 33: Irradiation power 34: Irradiation time 35: Irradiation pattern 38: Irradiation time and type	
Obtained data	When the irradiation mode is set:	0: OFF 1: CONSTANT 2: PATTERN
	When the irradiation power is set:	0 to 100
	When the irradiation time is set:	0 to 9999 (*0.1s)
	When the irradiation pattern is set:	0 to 15 (Actual pattern No. - 1)
	When the irradiation time type is set:	0: SETTING 1: UNLIMITED

(2) Command/response examples

The following shows an example of this command:

DATAGET 0 32 Delimiter ← The irradiation mode of channel 1 is obtained.

DATAGET 1 35 Delimiter ← The irradiation pattern of channel 2 is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

1 Delimiter ← Constant irradiation is set to channel 1.
OK Delimiter
15 Delimiter ← Pattern 16 is set to channel 2.
OK Delimiter

DATASET command

This command sets the irradiation conditions of the respective channel.

Command **DATASET <Channel No.> <Parameter No.> <Write data>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameters can be set by the DATASET command:

Parameter	Setting Range/Output Range	
Channel No.	0: Channel 1 1: Channel 2 2: Channel 3 3: Channel 4	
Parameter No.	32: Irradiation mode 33: Irradiation power 34: Irradiation time 35: Irradiation pattern 38: Irradiation time and type	
Write data	When setting irradiation mode:	0: OFF 1: CONSTANT 2: PATTERN
	When setting irradiation power:	0 to 100
	When setting irradiation time:	0 to 9999 (*0.1s)
	When setting irradiation pattern:	0 to 15 (Actual pattern No. - 1)
	When setting the irradiation time type:	0: SETTING 1: UNLIMITED

(2) Command/response examples

The following shows an example of this command:

DATASET 0 32 1 Delimiter ← Constant irradiation is set to channel 1.

DATASET 1 35 15 Delimiter ← Pattern 16 is set to channel 12.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

LOGDATA command

This command obtains the irradiation log data for the specified number of obtained data retroactive from the latest irradiation data (irradiation completed data).

Command **LOGDATA <Number of obtained data>** Delimiter

Response **<Target channel><Irradiation start time><Irradiation end time>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the LOGDATA command:

Parameter	Setting Range/Output Range
Number of obtained data	1 to 100
Target channel	1 to 4
Irradiation start time (hh:mm:dd)	00:00:00 to 23:59:59
Irradiation end time (hh:mm:dd)	00:00:00 to 23:59:59

The irradiation start time and end time refer to the elapsed time after the controller started up.

(2) Command/response examples

The following shows an example of this command:

LOGDATA 2 Delimiter ← Log data for the previous two data items before the latest irradiation data is displayed.

The following shows an example of a response to this command. Each line is separated by a delimiter.

1, 01:40:05, 01:41:05 Delimiter ← Irradiation of channel 1 is started 1 hour, 40 minutes and 05 seconds after controller startup, and ends 1 hour, 41 minutes and 05 seconds after controller startup.
OK Delimiter

2, 02:00:00, 02:05:00 Delimiter ← Irradiation of channel 2 is started 2 hours, 00 minutes and 00 seconds after controller startup, and ends 2 hours, 05 minutes and 00 seconds after controller startup.
OK Delimiter

ACCUMGET command

This command obtains cumulative energy values currently stored on the controller in individual channels.

This command is enabled only when a head is connected to the target channel. An error response is returned when a head is not connected.

Command **ACCUMGET <Target channel>** Delimiter

Response **<Cumulative energy value>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the ACCUMGET command:

Parameter	Setting Range/Output Range
Target channel	1 to 4
Cumulative energy value	0.0 to 99999999.9

(2) Command/response examples

The following shows an example of this command:

ACCUMGET 2 Delimiter ← The cumulative energy of channel 2 is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

1234.5 Delimiter ← The cumulative energy of channel 2 is 1234.5J.
OK Delimiter

SYSGET command

This command obtains system data.

Command **SYSGET <Parameter No.>** Delimiter

Response **<Obtained data>** Delimiter
OK Delimiter

(1) Parameter description

The following parameters can be set and obtained by the SYSGET command:

Parameter No.	Details	Obtained data (Setting range/Output range)
0	READY mode display data No.	0: Irradiation Conditions List Display 1: Irradiation Power Adjustment Display 2: Channel Specific Detail Display 3: Cumulative Energy List Display
1	LANGUAGE	0: JAPANESE 1: ENGLISH
2	Buzzer volume	0: OFF 1: LOW 2: HIGH
3	ECO display	0: OFF 1: ON
4	Menu color	0: MARINE BLUE 1: GRASS GREEN 2: ORANGE PEEL 3: STYLISH GRAY 4: SALMON PINK 5: NIGHTMARE
5	Irradiation control	0: ALL CH 1: INDIVIDUALLY
6	Analog input voltage	0: 1 to 5V 1: 0 to 1V
7	TERMINAL IN	0: CONTACT 1: SWITCH
8	RS-232C baud rate	0: 9600 1: 19200 2: 38400 3: 57600 4: 115200
9	RS-232C bit length	0: 8BIT 1: 7BIT
10	RS-232C parity	0: NONE 1: ODD 2: EVEN

Parameter No.	Details	Obtained data (Setting range/Output range)
11	RS-232C stop bit	0: 1BIT 1: 2BIT
12	RS-232C/USB delimiter	0: CR 1: LF 2: CR+LF
13	EMISSION button lock	0: OFF 1: ON
14	Channel irradiation button lock	0: OFF 1: ON

(2) Command/response examples

The following shows an example of this command:

SYSGET 0 Delimiter ← The READY mode display data No. is obtained.

SYSGET 2 Delimiter ← The buzzer volume is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

1 Delimiter ← READY mode display data is displayed in the Irradiation Power Adjustment Display.

OK Delimiter

1 Delimiter ← The buzzer volume is LOW.

OK Delimiter

SYSSET command

The system data is set.

Command **SYSSET <Parameter No.> <Write data>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameters can be obtained by the SYSSET command:

Parameter No.	Details	Write Data (Setting Range/Output Range)
0	READY mode display data No.	0: Irradiation Conditions List Display 1: Irradiation Power Adjustment Display 2: Channel Specific Detail Display 3: Cumulative Energy List Display
1	LANGUAGE	0: JAPANESE 1: ENGLISH
2	Buzzer volume	0: OFF 1: LOW 2: HIGH
3	ECO display	0: OFF 1: ON
4	Menu color	0: MARINE BLUE 1: GRASS GREEN 2: ORANGE PEEL 3: STYLISH GRAY 4: SALMON PINK 5: NIGHTMARE
5	Irradiation control	0: ALL CH 1: INDIVIDUALLY
6	Analog input voltage	0: 1 to 5V 1: 0 to 1V
7	TERMINAL IN	0: CONTACT 1: SWITCH
8	RS-232C baud rate	0: 9600 1: 19200 2: 38400 3: 57600 4: 115200
9	RS-232C bit length	0: 8BIT 1: 7BIT
10	RS-232C parity	0: NONE 1: ODD 2: EVEN

Parameter No.	Details	Write Data (Setting Range/Output Range)
11	RS-232C stop bit	0: 1BIT 1: 2BIT
12	RS-232C/USB delimiter	0: CR 1: LF 2: CR+LF
13	EMISSION button lock	0: OFF 1: ON
14	Channel irradiation button lock	0: OFF 1: ON

(2) Command/response examples

The following shows an example of this command:

SYSSET 0 1 Delimiter ← The Irradiation Power Adjustment Display is displayed.

SYSSET 2 1 Delimiter ← The buzzer volume is set to LOW.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

CALIBGET/CALIBSET commands

The reference value for power tuning is set by the CALIBGET command and executed by the CALIBSET command.

Command
- **CALIBGET <Channel No.>** Delimiter
- **CALIBSET <Channel No.>** Delimiter

Response
OK Delimiter

(1) Parameter description

The following parameter can be set by the CALIBGET and CALIBSET commands:

Parameter	Setting Range/Output Range
Channel No.	1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4

(2) Command/response examples

The following shows an example of this command:

CALIBGET 1 Delimiter ← Setting of the reference value for channel 1 is executed.

CALIBSET 1 Delimiter ← Power tuning of channel 1 is executed.

CALIBGET 2 Delimiter ← Setting of the reference value for channel 2 is executed.

CALIBSET 2 Delimiter ← Power tuning of channel 2 is executed.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

VERGET command

This command obtains system version information.

Command **VERGET** Delimiter

Response **<Software version>** Delimiter
OK Delimiter

(1) Parameter description

The following parameter can be obtained by the VERGET command:

Parameter	Setting Range/Output Range
Software version	ZUV-C30H VER.X.XXX(X=0-9)

(2) Command/response examples

The following shows an example of this command:

VERGET Delimiter ← The version information is obtained.

The following shows an example of a response to this command. Each line is separated by a delimiter.

ZUV-C30H VER.1.000 Delimiter ← The system version is 1.000.
OK Delimiter

HDATACLR command

This command initializes the cumulative irradiation energy and power tuning data saved on the controller.
After the head is replaced, be sure to initialize this data.

Command **HDATACLR <Channel No.>** Delimiter

Response **OK** Delimiter

(1) Parameter description

The following parameter can be set by the HDATACLR command:

Parameter	Setting Range/Output Range
Channel No.	1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4

(2) Command/response examples

The following shows an example of this command:

HDATACLR 1 Delimiter ← The irradiation cumulative energy and power tuning data for channel 1 is initialized.

The following shows an example of a response to this command.

OK Delimiter ← Command execution ends successfully.

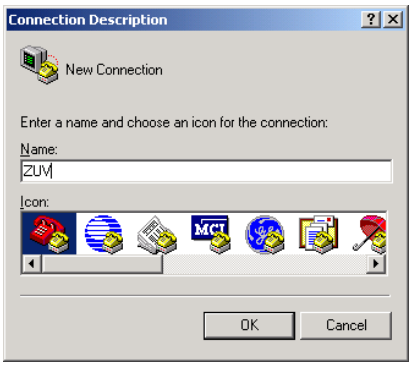
Setting Hyper Terminal

The example in this section describes the procedure for performing communications by non-procedural commands on the Windows standard tool Hyper Terminal.

1. Start up Hyper Terminal.

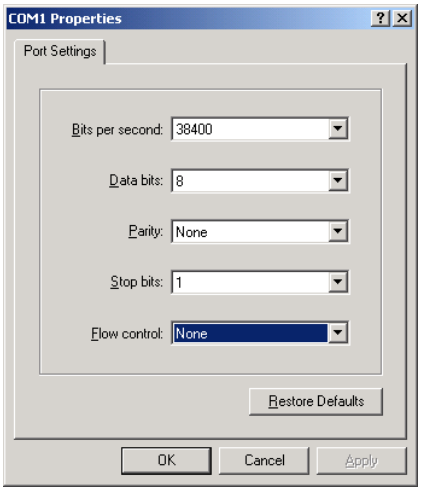
Hyper Terminal is provided under the [Communication] folder, which you can access by starting with the [Program] pop-up menu and selecting the [Accessory] folder.

(1) Enter an appropriate project name.



(2) Select a COM port where ZUV is connected at [Connect using].

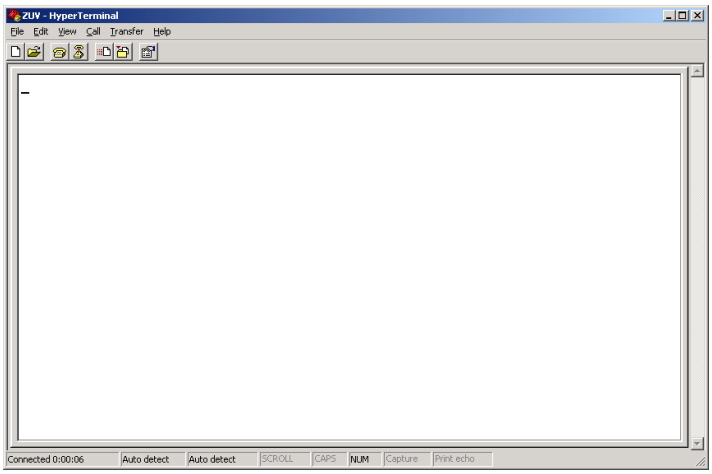
(3) Set the communication conditions.



CHECK!

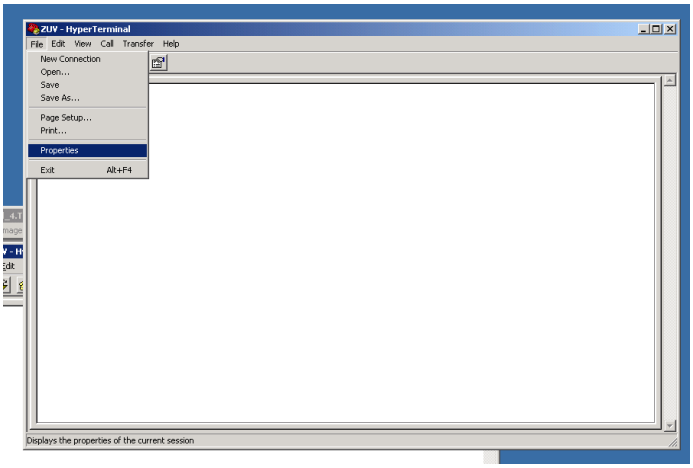
In the case of the USB connection, set [Bits per second] to [115200].

(4) Hyper Terminal is started up.

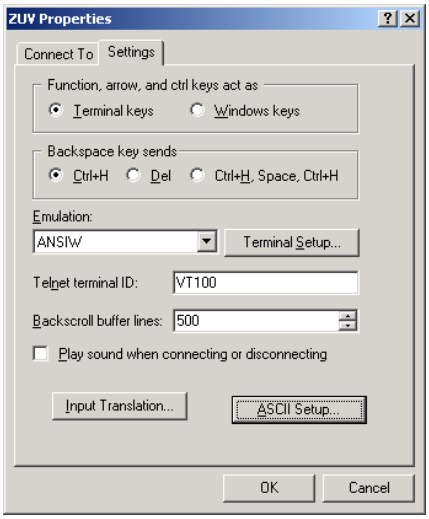


2. Set items such as echoback for easier understanding of command transactions.

(1) Select [Properties] to open the [ZUV Properties] dialog box.

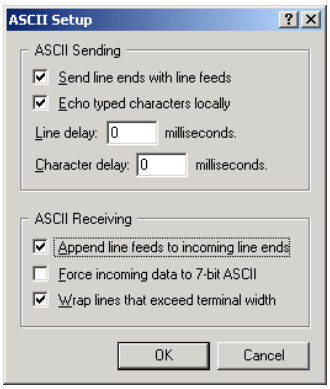


(2) Select the [Settings] tab and select [ASCII Setup...].



(3) Select the following checkboxes.

After selecting the desired checkboxes, click [OK].



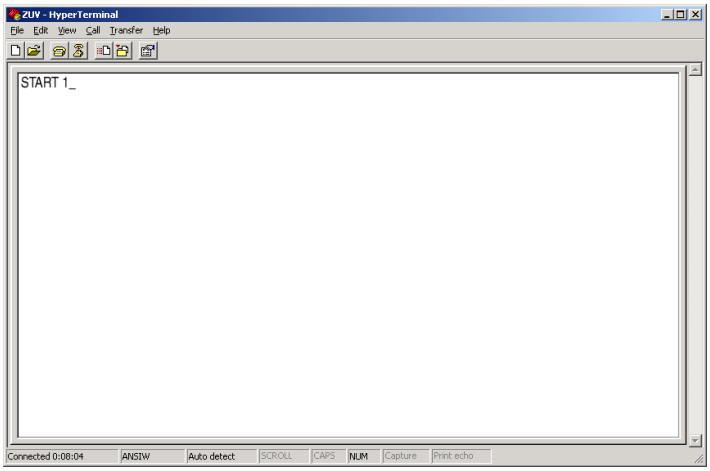
3. **Set the ZUV communication conditions.**

(1) Match the LOCK mode-[SYSTEM]-[COM] settings to the settings on the personal computer.

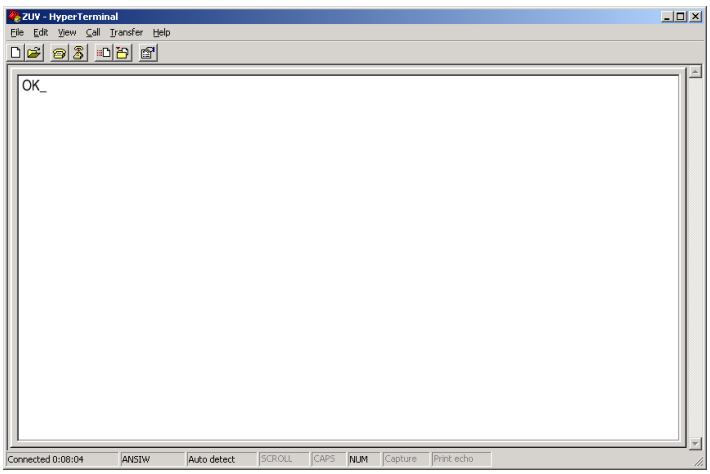
(2) Switch the controller to the READY mode.

4. **Execute non-procedural communications.**

(1) Enter a command. Press the RETURN key after entering the command.



(2) Obtain a response from the controller according to the command.



Section 5
APPENDIX

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Troubleshooting

This section describes countermeasures for temporary hardware problems. Before sending the hardware for repair, check the problem in this section.

Problem	Probable cause and possible countermeasure	Pages
The device restarts during operation.	• Is the power supply device connected correctly?	p.1-8
No output signals are generated.	• Are all cables connected correctly? • Is the signal line disconnected?	p.4-2
No input signal received	• Are all cables connected correctly? • Is the signal line disconnected?	p.4-2
No communications with a personal computer or programmable controller	• Is the USB cable connected correctly? • Is the RS-232 cable connected correctly?	p.4-9
Dark LCD screen	• Is the Eco mode function set? The "Eco" mode is set if pressing any key automatically returns to the original brightness. The brightness is maintained when the Eco mode setting is canceled. Note, however, that the life of the LCD backlight is shortened. So, we recommend setting the Eco mode. • Was the OFF command sent with the screen in a dark state? Set the Eco mode to ON in the LOCK mode or by the SYSSET command.	p.3-23
UV irradiation disabled	• Is the READY mode set? • Is the hardware key set to READY? • Are all cables connected correctly when controlling from a terminal block? • Is the signal line disconnected when controlling from a terminal block? • Is the head connected correctly? • Is the emergency stop input set to ON? • Is the READY indicator ON?	p.2-11
The bank is not switched even if the bank switching signal is input from the terminal block.	• Is the bank switching input setting enabled? • Is the operating mode set to the READY mode?	p.3-13
Banks cannot be switched from the RS-232C or the USB interface.	Is the bank switching input setting disabled?	p.3-13

Error Messages and Countermeasures

Display Details	Cause	Countermeasure
SYSTEM ERROR (CPU COMM)	The ZUV-C30H may have malfunctioned.	Contact your OMRON representative.
SYSTEM ERROR (FPGA)	The ZUV-C30H may have malfunctioned.	Contact your OMRON representative.
SYSTEM ERROR (FLASH ROM)	An error has occurred in the save memory.	Clear flash memory in the controller by holding down the SET key for 3 seconds. Contact your OMRON representative if normal operation is not restored.
SYSTEM ERROR (HEAD)	The head has become loose or malfunctioned, or the cable disconnected during operation.	Check to see if the head is connected, and turn ON the power again. Replace the head or cable if normal operation is not restored.
EMERGENCY HALT	The controller is in the emergency stop state because the emergency stop input is ON.	Set the emergency stop input to OFF. • Open the emergency stop input if the emergency stop input setting is [SHORT (default)]. • Short-circuit the emergency stop input if the emergency stop input setting is [OPEN].
HEAD LONGEVITY	The cumulative alarm threshold exceeds the cumulative irradiation time.	Replace with a new head.
SYSTEM ERROR (FAN)	The fan has malfunctioned and is not operating.	Contact your OMRON representative.
CHANGE HARD -WARE KEY TO [LOCK]	The power supply was turned ON when the key switch was in the "READY" position.	Change the position of the key switch to "LOCK".
CHANGE HARD -WARE KEY TO [READY]	The key switch is in the "LOCK" position when changing to the READY mode.	Change the position of the key switch to "READY".
MAX TIME ERROR	The total time exceeds 999.9(S) when determining the irradiation time of the irradiation pattern or when displaying [VIEW].	Press [OK], and reset the total time to less than 999.9(S).
UV LEVEL IS INVALID	The analog input value exceeds the range of the received light amount, for which the reference setting is available.	Check to see if the jig is connected, or replace the head.
NOT TEACHING	Power tuning is executed with the reference value unregistered.	Register the reference value, and then re-execute power tuning.
UV LEVEL IS INVALID	The analog input value exceeds the range of the received light amount, for which power tuning is available.	Check to see if the jig is connected, or replace the head.
ANALOG INPUT ERROR	Teaching or power tuning cannot be executed because the analog input value is not stable.	The UV light incident to the UV luxmeter may be unstable. Check the items below: • Stabilize the installations of the UV luxmeter and the UV irradiation head. • Execute teaching/power tuning in low-noise conditions.

Q&A

Question	Answer
I've lost the hardware key. What should I do?	Contact your OMRON sales representative.
Which settings are initialized when settings are initialized?	All settings except the cumulative irradiation energy and language settings are initialized.

Maintenance of the Head

This section describes how to clean or replace the head lens unit.

Cleaning the Lens Unit

Dirt on the lens surface decreases the UV-LED light transmission factor.
Remove dirt from the surface of the lens periodically using a soft cloth moistened with ethanol.

Care should be taken for the items below when cleaning the lens because cleaning may scratch the lens surface or remove its protective coating:

- Do not use any detergents. Use only ethanol.
- Do not wipe directly with a dry cloth.

Replacing the Lens Unit

Five lens units with different irradiation beam diameters are provided for the ZUV series. Replace the lens unit according to the desired irradiation area or necessary intensity.

CHECK!

Always turn OFF the power before replacing the lens. The controller may malfunction or cause an accident if the lens is replaced while the power is ON.

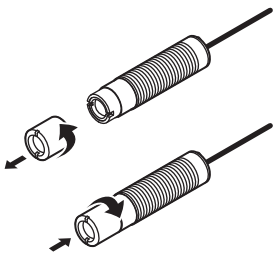
⚠ WARNING

Never look directly at or allow your skin to be exposed to the ultraviolet light.
To prevent exposure to ultraviolet light, never look into the ultraviolet light.
Workers should wear protective goggles and equipment to protect them from being exposed to reflected light.

Electric shock or light leakage may cause injury.
Do not disassemble the product.

1. Turn the lens unit in the direction of the arrow to take the lens unit out from the head unit.

2. Turn the replacement lens unit in the direction of the arrow to install it on the head unit.
Tightening torque: 0.2 N•m



CHECK!

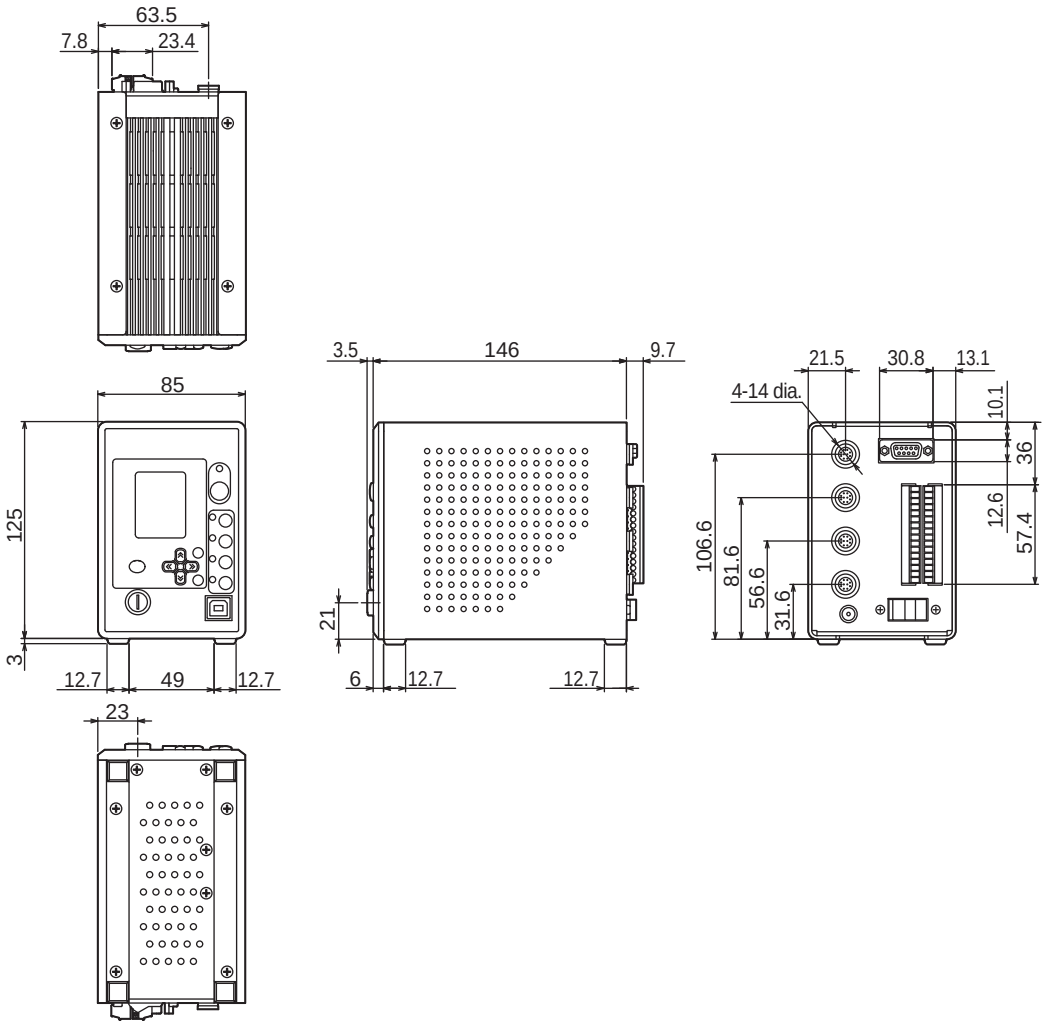
Screws may be damaged if the torque is outside the specifications.

Specifications and External Dimensions

Controller

ZUV-C30H

(Unit: mm)

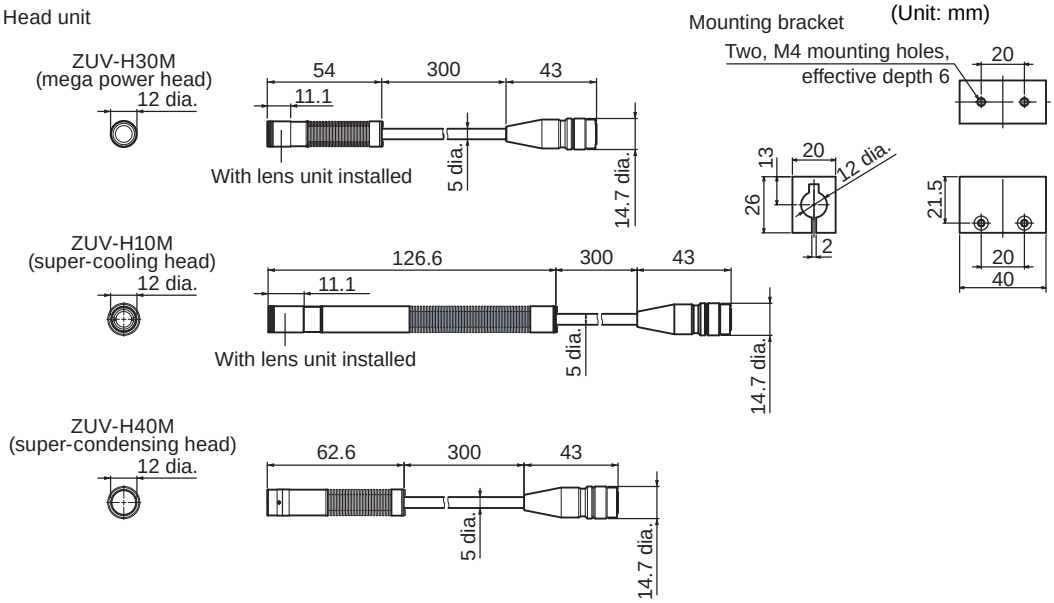


Model		ZUV-C30H
Irradiation method	Constant irradiation	Irradiation power (0 to 100%), irradiation time (max.999.9 seconds/ unlimited)
	Pattern irradiation	Can be set to step or ramp (linear) (16 points specified per setting)
Number of settings		16 banks
Terminal block I/O	Inputs	Emergency stop, Start/stop UV irradiation (4 channels), Select settings (banks)
	Outputs	Ready (4 channels), UV irradiating, errors
RS-232C and USB	Inputs	Start/stop UV irradiation (4 channels), select settings (banks), get/change setting data, save/read data, execute power tuning, get cumulative irradiation energy
	Outputs	
Cooling method		Fan air cooling
Power supply voltage		Select AC or DC power supply. • AC power supply: 100 to 240 VAC±10%, 50/60 Hz (AC adapter supplied) • DC power supply: 24 VDC±10% (supplied from the terminal block on rear of unit)
Current consumption		• With AC adapter: 2.3 A (55 VA) • With DC power supply: 1.9 A (45 VA)
Vibration resistance		10 to 150 Hz acceleration: 50 m/s^2 single amplitude: 0.35 mm each of the X, Y and Z directions for 8 minutes, 10 times
Drop impact resistance		150 m/s^2 each in 6 directions (up/down, left/right, forward/backward), for 3
Ambient temperature range		Operating: 5 to 35°C; Storage: -10 to 60°C (with no condensation or icing)
Ambient humidity range		Operating/storage: 30% to 85% (with no condensation)
Degree of protection		IEC 60529 IP20
Materials		SUS, aluminum
Weight (packed state)		Approx. 2950 g (main unit: approx. 1,900 g)
Accessories		Instruction Sheet (this document), key, AC adapter, Quick Setting Guide, CD-ROM (including the USB driver and User's Manual PDF edition)

Head

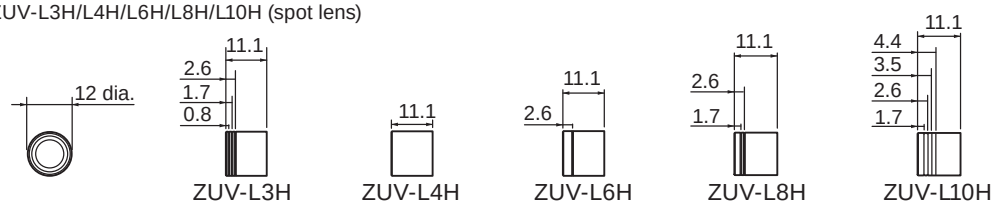
Head unit

(Unit: mm)

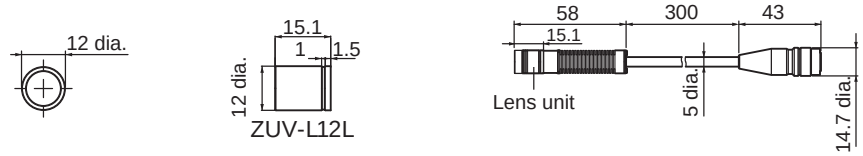


Lens unit

ZUV-L3H/L4H/L6H/L8H/L10H (spot lens)

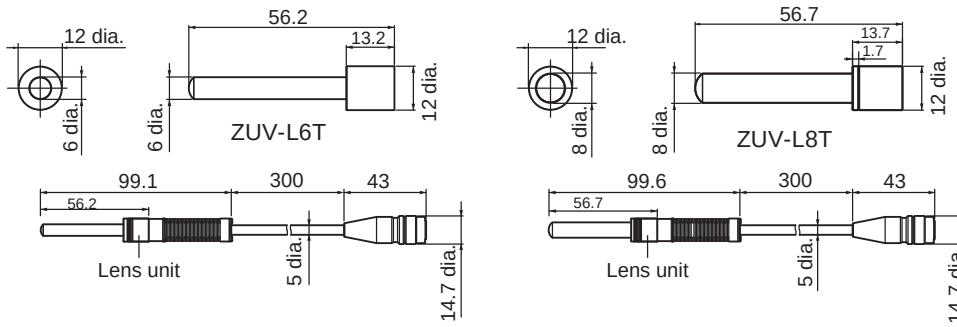


ZUV-L12L (line beam lens)



When mounted on ZUV-H30M (mega power head)

ZUV-L6T/L8T (small-diameter lens)



When mounted on ZUV-H30M (mega power head)

Head unit model		ZUV-H30M/H30H/H10M				
Lens unit model		ZUV-L3H	ZUV-L4H	ZUV-L6H	ZUV-L8H	ZUV-L10H
Light source	Wavelength	365 nm				
	Class	Class3B (JIS C 6802 2005), Class 3B (EN60825-1:1994 +A1:2002 +A2:2001)				
Spot Diameter		3 mm dia.	4 mm dia.	6 mm dia.	8 mm dia.	10 mm dia.
ZUV-H30M/ H10M	Recommended distance to workpiece	11 mm	14 mm	15 mm	15 mm	30 mm
	Peak illumination*1	6000 mW/cm^2	4600 mW/cm^2	3200 mW/cm^2	1600 mW/cm^2	350 mW/cm^2
Vibration resistance		10 to 150 Hz acceleration: 50 m/s^2 single amplitude: 0.35 mm each of the X, Y and Z directions for 8 minutes, 10 times				
Drop impact resistance		150 m/s^2 each in 6 directions (up/down, left/right, forward/backward), for 3				
Ambient temperature range		Operating: 5 to 35°C; Storage: -10 to 60°C (with no condensation or icing)				
Ambient humidity range		Operating/storage: 30% to 85% (with no condensation)				
Degree of protection		IEC60529 IP40				
Materials		Head: Bronze, aluminum, glass Lens unit: aluminum, glass				
Weight (packed state)		ZUV-H30M/H30H: approx. 150 g (main unit: approx. 55 g) ZUV-H10M approx. 180 g (main unit: approx. 105 g), ZUV-L3H/L4H/L6H/L8H/L10H: approx. 10 g (main unit: approx. 5 g)				
Accessories		ZUV-H30M/H30H: Instruction Sheet, Mounting bracket (with M3 screws), Warning labels (in English) ZUV-H10M: Instruction Sheet, Mounting bracket (with M3 screws), Warning labels (in English) ZUV-L3H/L4H/L6H/L8H/L10H: Instruction Sheet				

Head unit model		ZUV-H30M/H30H/H10M		
Lens unit model		ZUV-L12L	ZUV-L6T	ZUV-L8T
Light source	Wavelength	365 nm		
	Class	Class3B (JIS C 6802 2005), Class 3B (EN60825-1:1994 +A1:2002 +A2:2001)		
Beam shape		12 mm	1.5 mm dia.	3 mm dia.
ZUV-H30M/ H10M	Recommended distance to workpiece	15 mm	6 mm	9 mm
	Peak illumination*1	400 mW/cm^2*2	5000 mW/cm^2	4000 mW/cm^2
Vibration resistance		10 to 150 Hz acceleration: 50 m/s^2 single amplitude: 0.35 mm each of the X, Y and Z directions for 8 minutes, 10 times		
Drop impact resistance		150 m/s^2 each in 6 directions (up/down, left/right, forward/backward), for 3		
Ambient temperature range		Operating: 5 to 35°C; Storage: -10 to 60°C (with no condensation or icing)		
Ambient humidity range		Operating/storage: 30% to 85% (with no condensation)		
Degree of protection		IEC60529 IP40		
Materials		Head: Bronze, aluminum, glass Lens unit: aluminum, glass		
Weight (packed state)		ZUV-H30M/H30H: approx. 150 g (main unit: approx. 55 g) ZUV-H10M approx. 180 g (main unit: approx. 105 g), ZUV-L12L approx. 30 g (main unit: approx. 5 g), ZUV-L6T: approx. 35 g (main unit: 7 g), ZUV-L8T: approx. 40 g (main unit: 10 g),		
Accessories		ZUV-H30M/H30H: Instruction Sheet, Mounting bracket (with M3 screws), Warning labels (in English) ZUV-H10M: Instruction Sheet, Mounting bracket (with M3 screws), Warning labels (in English) ZUV-L12L/L6T/L8T: Instruction Sheet		

Head unit model		ZUV-H40M
Light source	Wavelength	365 nm
	Class	Class3B (JIS C 6802 2005), Class 3B (EN60825-1:1994 +A1:2002 +A2:2001)
Spot diameter		3 mm dia.
Recommended distance to workpiece		10 mm
Peak illumination*1		8100 mW/cm^2
Vibration resistance		10 to 150 Hz acceleration: 50 m/s^2 single amplitude: 0.35 mm each of the X, Y and Z directions for 8 minutes, 10 times
Drop impact resistance		150 m/s^2 each in 6 directions (up/down, left/right, forward/backward), for 3
Ambient temperature range		Operating: 5 to 35°C; Storage: -10 to 60°C (with no condensation or icing)
Ambient humidity range		Operating/storage: 30% to 85% (with no condensation)
Degree of protection		IEC60529 IP40
Materials		Aluminum, glass, bronze
Weight (packed state)		Approx. 150 g (main unit: approx. 60 g)
Accessories		Instruction Sheet, Mounting bracket (with M3 screws), Warning labels (in English)

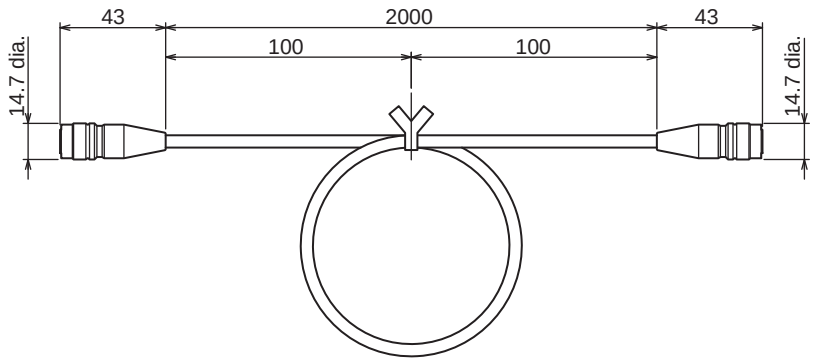
*1: With irradiation power at 100%, room temperature at 25°C, and the radiator jig mounted. These are not guaranteed figures.

*2: Irradiation value at a distance to workpiece of 15 mm and in a range beam length range of 12 mm.

•Extension cable

ZUV-XC2B

(Unit: mm)



LED Safety

Various safety standards regarding LED products are stipulated depending on the country of use.
Take safety measures according to each standard.

Classification

Standards and classification (*)
JIS C 6802 (Japan) EN60825/IEC60825-1 (Europe)
Class 3B

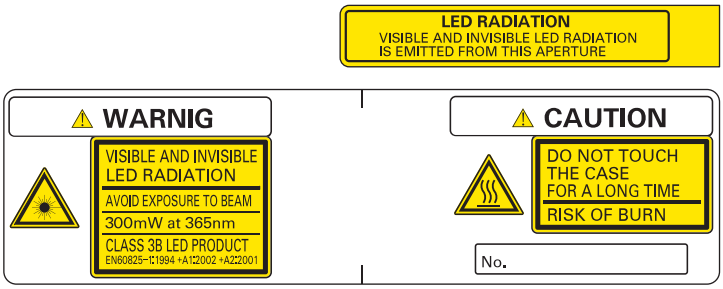
* For products exported to countries other than Japan and Europe, different safety standards are applied according to the country. Check the LED safety regulations and standards of the relevant country.

Label Replacement

The warning label written in Japanese is affixed to the head unit. For countries other than Japan, warning labels must be replaced by English ones (supplied with the head unit).

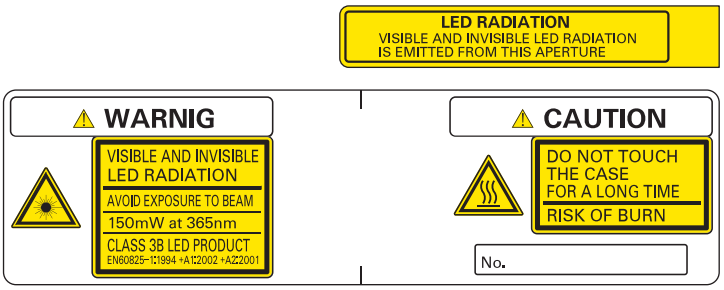
■ ZUV-H__M

•English label



■ ZUV-H__H

•English label



Requirements from Regulations and Standards

Summary of Requirements to Manufactures

■ For Europe

EN 60825-1 "Safety of Laser Products, Equipment Classification, Requirements and User's Guide"

Summary of Manufacturer's Requirements

Requirements subclause	Classification						
	Class 1	Class 1M	Class 2	Class 2M	Class 3R	Class 3B	Class 4
Description of hazard class	Safe under reasonably foreseeable conditions	As for Class 1 except may be hazardous if user employs optics	Low power; eye protection normally afforded by aversion responses	As for Class 2 except may be more hazardous if user employs optics	Direct intrabeam viewing may be hazardous	Direct intrabeam viewing normally hazardous	High power; diffuse reflections may be hazardous
Protective housing		Required for each laser product; limits access necessary for performance of functions of the products					
Safety interlock in protective housing	Designed to prevent removal of the panel until accessible emission values are below that for Class 3R				Designed to prevent removal of the panel until accessible emission values are below that for Class 3B		
Remote control	Not required					Permits easy addition of external interlock in laser installation	
Key control	Not required					Laser inoperative when key is removed	
Emission warning device	Not required				Give audible or visible warning when laser is switched on or if capacitor bank of pulsed laser is being charged. For Class 3R only, applies invisible radiation is emitted		
Attenuator	Not required					Give means beside the On/Off switch to temporarily to block beam	
Location controls	Not required				Controls so located that there is no danger of exposure to AEL above Classes 1 or 2 when adjustments are made		
Viewing optics	Not required	Emission from all viewing systems must be below Class 1M AEL					
Scanning	Scan failure shall not cause product to exceed its classification						
Class label	Required wording		Figures A required wording				
Aperture label	Not required				Specified wording required		
Service entry label	Required as appropriate to the class of accessible radiation						
Override interlock label	Required under certain conditions as appropriate to the class of laser used						

Requirements subclause	Classification						
	Class 1	Class 1M	Class 2	Class 2M	Class 3R	Class 3B	Class 4
Wavelength range label	Required for certain wavelength ranges						
LED label	Make required word substitutions for LED products						
User information	Operation manuals must contain instructions for safe use. Additional requirement apply for Class 1M and Class 2M						
Purchasing and service information	Promotion brochures must specify product classification; service manuals must contain safety information						

Note: 1.This table is intended to provide a convenient summary of requirements. See text of this standard for complete requirements.
2. For the safety medical laser products, IEC 60601-2-22 applies
3.AEL: Accessible Emission Limit
The maximum accessible emission level permitted within a particular class. For your reference, see ANSI Z136.1-1993, Section 2.

Symbol and border: black
Background: yellow

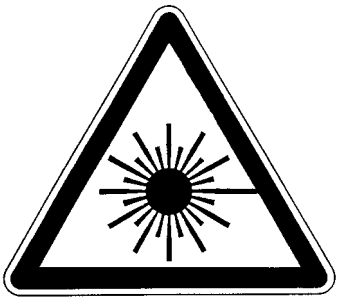


Figure A Warning label - Hazard symbol

Legend and border: black
Background: yellow

Summary of Requirements to User

■ For Europe

EN 60825-1

Requirements subclause	Classification						
	Class 1	Class 1M	Class 2	Class 2M	Class 3R	Class 3B	Class 4
Laser safety officer	Not required but recommended for applications that involve direct viewing of the laser beam				Not required for visible emission Required for non-visible emission	Required	
Remote interlock	Not required					Connect to room or door circuits	
Key control	Not required					Remove key when not in use	
Beam attenuator	Not required					When in use prevents inadvertent exposure	
Emission indicator device	Not required				Indicates laser is energized for non-visible wavelengths	Indicates laser is energized	
Warning signs	Not required					Follow precautions on warning signs	
Beam path	Not required	Class 1M as for Class 3B (see note 2)	Not required	Class 2M as for Class3B (see note 3)	Terminate beam at end of useful length		
Specular reflection	No requirements	Class 1M as for Class 3B (see note 2)	No requirements	Class 2M as for Class3B (see note 3)	Prevent unintentional reflections		
Eye protection	No requirements					Required if engineering and administrative procedures not practicable and MPE exceeded	
Protective clothing	No requirements					Sometimes required	Specific requirements
Training	No requirements	Class 1M as for Class 3R (see note 2)	No requirements	Class 2M as for Class3R (see note 3)	Required for all operator and maintenance personnel		

Note: 1.This table is intended to provide a convenient summary of requirements. See text of this standard for complete precautions.

2.Class 1M laser products that failed condition 1 of table10 of the standard. Not required for Class 1M laser products that failed condition 2 of table10 of the standard. See the text for details.

3.Class 2M laser products that failed condition 1 of table10 of the standard. Not required for Class 2M laser products that failed condition 2 of table10 of the standard. See the text for details.

Definitions of Laser Classification

■ For Europe

Laser Product Classifications
EN

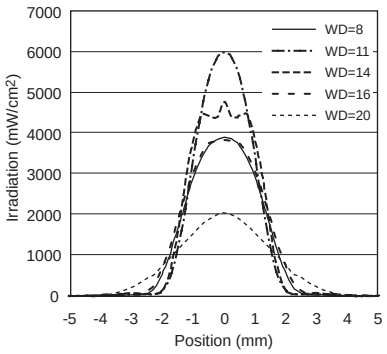
Class	Description
Class 1	Lasers which are safe under reasonably foreseeable conditions of operation.
Class 2	Lasers emitting visible radiation in the wavelength range from 400 nm to 700 nm. Eye protection is normally afforded by aversion responses including the blink reflex.
Class 3A	Lasers which are safe for viewing with the unaided eye. For laser emitting in the wavelength range from 400 nm to 700 nm, protection is afforded by aversion responses including the blink reflex. For other wavelengths the hazard to the unaided eye is no greater than for Class 1. Direct intrabeam viewing of Class 3A lasers with optical aides (e.g., binoculars, telescopes, microscopes) may be hazardous.
Class 3B	Direct intrabeam viewing of these lasers is always hazardous. Viewing diffuse reflections is normally safe (see note).
Class 4	Lasers which are also capable of producing hazardous diffuse reflections. They may cause skin injuries and could also constitute a fire hazard. Their use requires extreme caution.

Note: Conditions for safe viewing of diffuse reflections for Class 3B visible lasers are: minimum viewing distance of 13 cm between screen and cornea and a maximum viewing time of 10 s. Other viewing conditions require a comparison of the diffuse reflection exposure with the MPE.

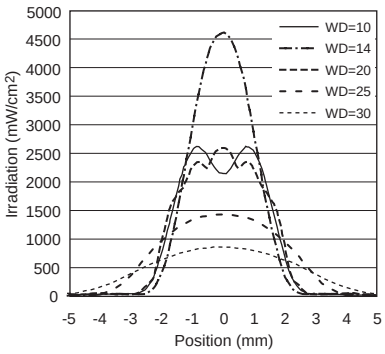
Intensity Distribution Data (Typical Examples)

- Controller: ZUV-C30H
- Head: ZUV-H30M/H10M (irradiation with power 100%)

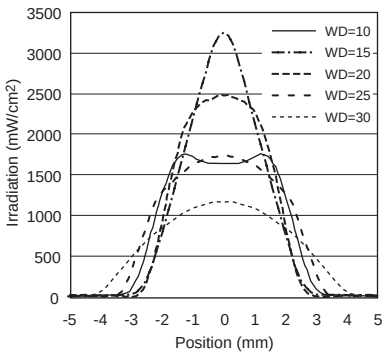
When lens unit ZUV-L3H is mounted:



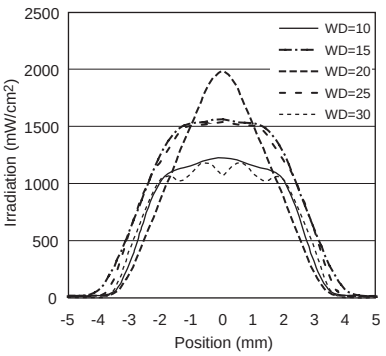
When lens unit ZUV-L4H is mounted:



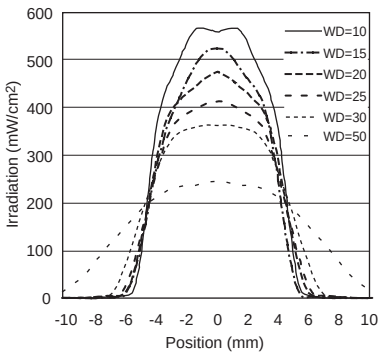
When lens unit ZUV-L6H is mounted:



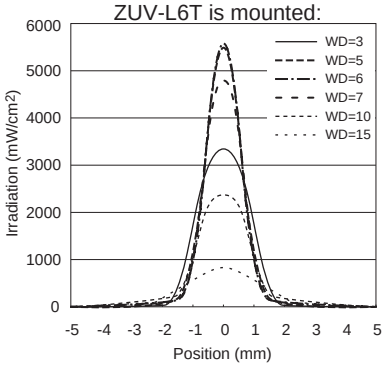
When lens unit ZUV-L8H is mounted:



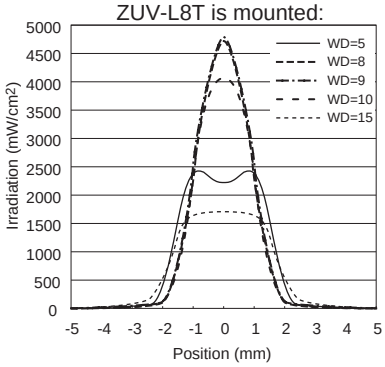
When lens unit ZUV-L10H is mounted:



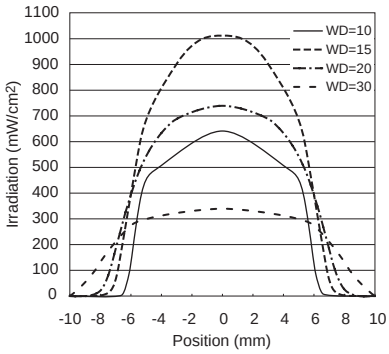
When small-diameter lens ZUV-L6T is mounted:



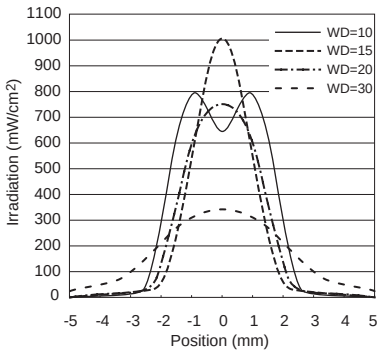
When small-diameter lens ZUV-L8T is mounted:



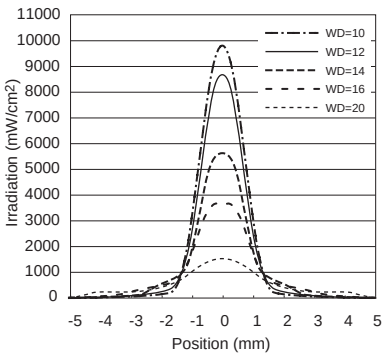
When line beam lens ZUV-L12L is mounted (lengthwise direction):



When line beam lens ZUV-L12L is mounted (crosswise direction):



- Controller: ZUV-C30H
- Head: ZUV-H40M (irradiation with power 100%)



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VERGET command 4-35
VERSION 3-22

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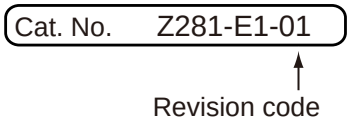
Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and back covers of this manual.



Revision code	Date	Revised contents
01	April 2008	Original production

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OMRON Industrial Automation Global: **www.ia.omron.com**

Cat. No. Z281-E1-01

Printed in Japan
0508-0.5M (0508) (M)